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NATURE MAGAZINE

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The Wild Heart

"As fascinating as fiction" is a thoughtless simile. We have heard it applied to "The Wild Heart" by Emma-Lindsay Squier, published by Cosmopolitan Book Corporation. This volume is a Nature Volume and Nature is far more fascinating than fiction can ever be made to be. It is a collection of stories of the wild of such charm of both subject matter and writing that they can, like O. Henry, be read and reread. In a forceful preface, the late Gene Stratton-Porter says: "Any human being carrying in his breast a wild heart knows instinctively how to fraternize with the wild. Anyone carrying a heart of fear and antagonism will have a troubled journey through forest or desert. The writer of this book proves that she carries a wild heart in her breast. Her records are unquestionably true. They are precisely the same things that happen to anyone having a heart in tune with Nature."

This volume leaves the reader with a regret that it does not contain more of these stories. As if to anticipate this inevitable demand, the publishers have brought out at the same time a sequel under the title of "On Autumn Trails." In this collection the wild heart beats again. It is to be hoped that the number of Nature writings by Miss Squier will be legion, for they carry a message of love and understanding beyond measure.

An Entomology Text

Remarkably complete, excellently illustrated and prepared with the utmost care is "A General Textbook of Entomology," written by A. D. Imms, M.A., D.Sc., Chief Entomologist of the Rothamstead Experiment Station, Harpenden, and published by E. P. Dutton and Company, New York. This volume, with its fine index, is intended to meet the need of a textbook for the research worker in entomology, a subject which today has more importance than ever before with the numbers of members of the insect world who create economic problems. It is in no sense an elementary textbook. It is instead a remarkable reference volume treating the subject in three sections—anatomy and physiology, development and classification. Although it might at first appear restricted in its adaptation to general use, the lay student of entomology and even the casual individual interested now and then in insects will find it a source of final and authentic information.

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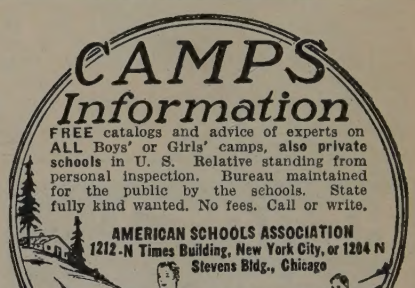

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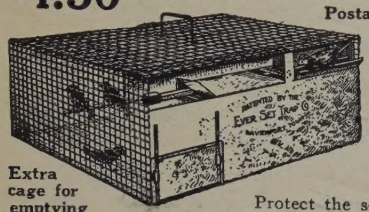

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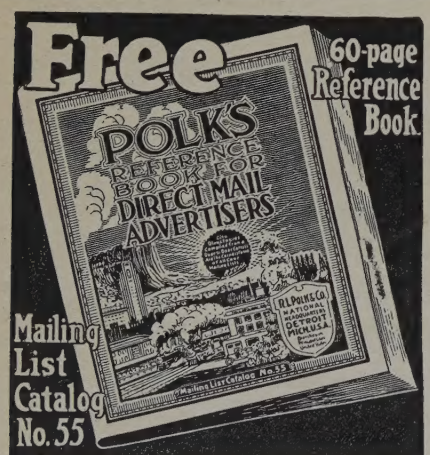

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A New Geography

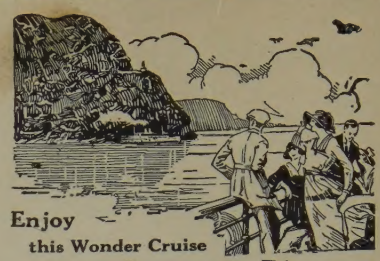
Going behind the facts of geography for causes is something rather new in textbook geographies, and this is what "High Lights of Geography" just published by the World Book Company of Yonkers-on-the-Hudson does. This is the combined work of David Starr Jordan and Katherine Dunlap Cather, dictated in the rough by the eminent educator and put into final form by the well-known writer of educational material for the young people. This volume, which covers North America, cannot but make geography a fascinating study. It is attractively written and illustrated and it conducts the student through a story of the reasons why the geography of the country is what it is rather than just a telling of the fact that things are so. It should prove a stimulating textbook.

Reforesters of America

"The Sapling of Today Is the Man Timber of Tomorrow," is the apt slogan that the American Reforestation Association prints on the cover of its attractive publication entitled "Reforesters of America." The book of 118 pages is beautifully printed and contains much inspirational material covering the planting of the tree; tree and forestry poetry; historic trees; forest resources of the United States; a tree-planting program. The headquarters of the organization are in Los Angeles, and it is, therefore, only natural that the motion picture world should find its way into the publication. It does with a number of attractive pictures of silver screen luminaries planting trees. Douglas Fairbanks, Jackie Coogan, Mary Pickford, Bill Hart, Viola Dana, Harold Lloyd, Colleen Moore, Milton Sills, Rudolph Valentino and Pola Negri are among those present. The president of the Association is George H. Barnes, and the publication is prepared by Mabel L. Mills, secretary.

Camping Out

"Camping out may well be classed as one of the liberal arts, so wide is its application," says Warren H. Miller in the preface to his volume, "Camping Out," published by D. Appleton and Company, New York. "Once the bulwarks of civilization are removed, veteran and type alike come under the same skies, and must conform to the same principles governing life in the open." Mr. Miller's volume then proceeds entertainingly and completely to set up certain signposts for the guidance of the camper. It covers the equipment best to carry, tent making, cooking and various kinds of camping and how to go about them. It is written in an easy narrative style, making it enjoyable to read as well as to practise.



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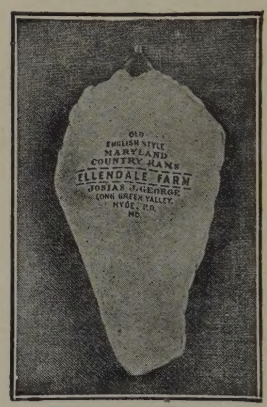

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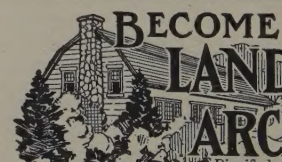

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"The history of the changing sand dunes is recorded by Dr. Townsend with the same accuracy that an archaeologist uses in tracing the growth and decline of a great civilization," says Ralph Hoffman in his preface to a new edition of Dr. Charles Wendell Townsend's "Sand Dunes and Salt Marshes" brought out by L. C. Page and Company of Boston. "The progress of individual dunes from year to year, their height, their changing contours, their destructive march over orchards and groves, are set down with scientific care, but there is preserved as well the exhilaration that one feels in mounting their clean, bare slopes and looking off over the blue sea to distant Agamenticus."

Selborne Persists

One hundred and thirty-six years have elapsed since the first publication of Gilbert White's "Natural History of Selborne" and during these years this little volume has sold steadily and climbed to the position of literature like that held by the "Compleat Angler." Now Andrew Melrose, of Pilgrim Street, E.C., London, brings out this interesting Nature book in a reasonably priced volume and is finding it still popular. For those who do not know it—and they have a pleasure before them—it is the story of Nature as observed by a genial and Nature-loving clergyman who wrote of his observations to two friends. The volume is made up of the letters and they combine both literary charm with authenticity of Nature material. It is a Nature book for the odd moments, to be read as one reads literature of a past century, with pleasure and profit.

General Science

To make science a living thing to the young student was the first aim of William H. Snyder, principal of the Hollywood High School, Los Angeles, in his book "General Science," published by Allyn and Bacon. He recognizes the primary objectives of general science to be "to furnish a fund of scientific information that will help pupils to interpret their environment and to inculcate in young students the habit of thinking from cause to effect and back from effect to cause." The author treats scientific problems in their relation to human welfare and shows the usefulness of science by innumerable applications. His work is a textbook, attractively illustrated, simply and interestingly written and achieves admirably the aim that the author set for himself and writing it.

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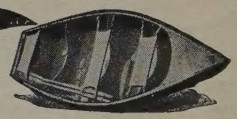

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August

Nature Calendar

AUGUST

"So do I love
Its shimmering August mood keyed to the sun,
A harlequin of color, birds, and bloom,
Nasturtiums, zinnias, balsams, salvias blaze
By vivid dahlias, tiger-lilies burn
In scarlet shadow of Jerusalem-cross;
Beyond the queen-hydrangeas splendid rule
Barbaric marigolds; chrysanthemums
Outshine gladioli, and sunflowers flaunt
Their crests of gold beneath the giant gourds."

—*Gertrude Huntington McGiffert.*

Huckleberries are ripening in the swamps.

Molting time for birds has begun and with it a decrease in the volume of bird-song.

Gray wolf cubs are now old enough to follow their parents. From now on, at least until the next mating season, the family will travel and hunt together.

The garden of old-fashioned flowers is in all its glory of bloom and color.

Sundew is blooming in the bogs. This carnivorous plant ensnares insects on its sticky, hairy leaves.

Elderberry bushes have changed the white flowers of a month ago for rich ripe fruit.

The bright scarlet flowers of oswego tea or bee balm are conspicuous near some small stream or on a moist hillside.

You may find the large yellow American lotus blooming in still waters.

Chicory adds a touch of deep azure to meadows and waysides.

Queen Anne's lace, field mustard and yarrow seem to dispute possession of fields and roadsides.

Dogbane beetles are numerous on the plant of the same name. They are bright little creatures of metallic red and green.

The morning-glory, too, is often thick with beetles. There are four or five different kinds which feed on it.

This is the concert season for insects, when crickets, grasshoppers, katydids, and cicadas join their music to the great symphony of the out-of-doors.

The burnt orange on the under side of the leaves of berry bushes is called orange-rust, a fungus disease common to both blackberries and raspberries.

Choke cherries are turning a deep rich shade.

Wild-rice marshes are now the meeting places for large flocks of bobolinks.

Fields and meadows are thick with tall magenta flower clusters of Joe-pye-weed. Pleasant the river bank where they mingle with the yellow of sunflowers and the white of boneset.

This is the time to sugar for moths. Probably the majority which come to the tree you have sweetened for them will belong to one large family, the Noctuids.

Spiders are especially numerous now. A walk afield will bring you in direct contact with many of their webs.

Swollen portions on the stems of the goldenrod and abnormalities on different leaves remind us that there is a close relationship between insect and plant life.

The pewee still sings throughout the day. Even after sunset and at twilight he may be heard.

Along the banks of wooded streams, often in the shadow of overhanging branches, green herons, and sometimes blue herons, may be surprised at their fishing.

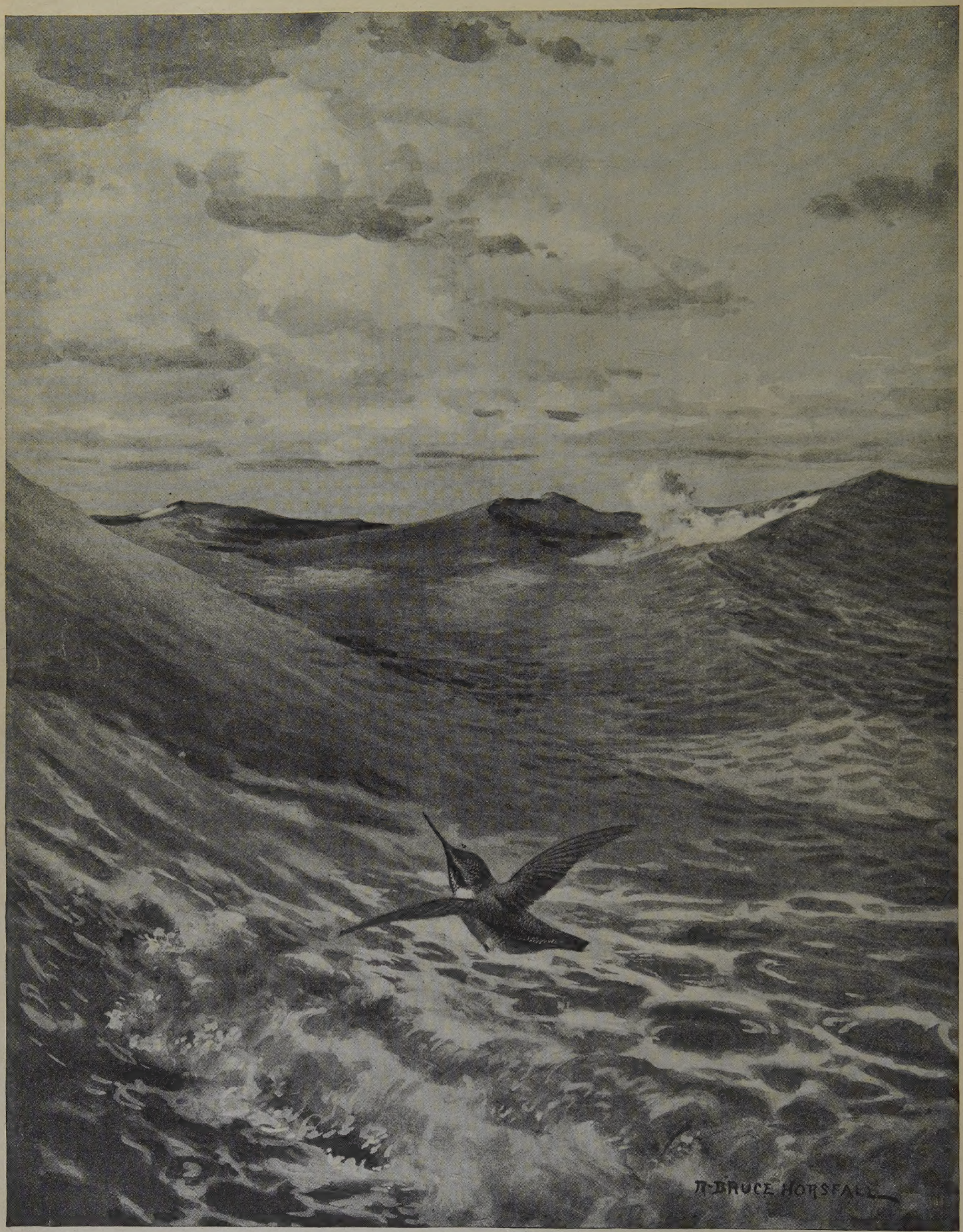
The cardinal is still calling his "what cheer."

About the middle of August young minks begin to take hunting expeditions by themselves and soon after the family breaks up entirely.

Baby bobwhites are almost full grown now. Do not be surprised if you flush a covey in your tramp through the woods.

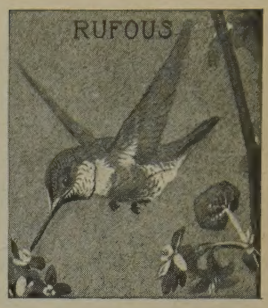
Golden plovers are now feeding on crowberries in Labrador; storing up enough fat on their bodies to sustain them in the long flight to winter quarters in Brazil or Argentina.

Prepared for Nature Magazine by the Cleveland Museum of Natural History



FIVE HUNDRED MILES OVER THE WATERS OF THE GULF OF MEXICO

NATURE MAGAZINE



Vol. VI AUGUST, 1925 No. 2

"On all his sad or restless moods
The patient peace of Nature stole;
The quiet of the fields and woods
Sank deep into his soul."
—WHITTIER

Hummingbirds—The Story of Ruby-throat

By R. BRUCE HORSFALL

(ILLUSTRATED BY A FULL-PAGE INSERT IN COLOR FROM A PAINTING BY THE AUTHOR AND BY HIS OWN DRAWINGS)

LIKE a winged bullet, a Ruby-throated Hummingbird shot away from the coast of Yucatan. Out over the broad, trackless expanse of gulf waters it flew in a bee line for the northwest shores of Florida, full five hundred miles away.

It was not lack of food or, indeed, a change in the weather that made Ruby want to leave those wonderful flowering vales already in the full glory of bloom, for no words can describe the fullness and richness of a tropical spring. Yet Ruby was leaving it all behind and bravely launching out on a hazardous journey. At daybreak he had felt the urge again to see his summer home. Breakfasting hastily, the sun had barely topped the purling waters before he was off.

Imagine, if you please, a copper penny taking wings and starting out to fly across the Gulf of Mexico, or from New York City to Detroit, Mich., and you will have some conception of this mite in feathers, for their weights are equal, forty-eight grains of flesh and blood as against the same in copper.

Hummingbirds are thought by many to be the fastest birds in flight, but I believe this is a mistake induced by their diminutiveness. Probably fifty miles an hour or possibly a mile a minute would be nearer the mark. E. H. Eaton, in "Birds of New York," estimates their speed at thirty to fifty miles per hour.

MOTHER HAD BUILT A CUP OF DOWN

With a buzz and hum and an excited "chip, chip," Ruby faced across the rising sun. In a few hours it was above him. Without compass or guide, Ruby steered a straight course for his goal. About noon a strong head wind arose, and Ruby dropped to the trough of the waves. There, away from the force of the blasts and protected by the rise and fall of the waters, he flew bravely onward. Late in the afternoon an anxious and tired little hummer took advantage of a temporary lull in the breeze to rise a few feet, and his weary heart and wings beat

faster and took on a new energy. Ahead, not many miles away, were land and rest.

In the lower branches of a small bush near the shore Ruby alighted. Triumphant and happy, he closed his eyes in sleep. But not for long. He was tired; also he was thirsty and hungry. What fortune was his. He had chanced upon a bush whose curled-over leaves betokened aphides beneath. Ruby knew that inside those shriveled leaves was a combination food and drink beloved by all hummers, and he was not long in availing himself of this delectable manna.

For a week Ruby loitered and revelled among the early April flowers of the coast, when again the urge to go north possessed his gallant soul and away he sped. Short daily flights of about fifty miles and our Ruby-throat was soon sipping the sweets of the opening weigela blooms in Maryland. But his destination was among the apple blossoms to the north. His heart was set on a certain lovely little farm planted to orchard and peach trees with a garden rich in all kinds of flowers and presided over by people who loved flowers and hummers. Ruby knew exactly where it was and, by a forced flight, arrived quite early one morning. He was fairly mad with delight, dancing about from one blossom to another, examining every tree and every bush. He knew that he could not expect Mrs. Hummer for another week, but his was the task of holding the garden against all rivals until she came.

BROTHER AND SISTER IN THE TRUMPET VINE

About the middle of May Mrs. Ruby arrived, and he knew the exact moment that she came into that garden. In fact, all morning he had been expecting her and was too excited to stay still one minute. And then she was there. Now indeed Ruby's joy knew no bounds, he danced and pivoted, cut circles and zigzagged like lightning flashes. As a climax he would swing up in the air, then swoop down with a little singing accompaniment to the hum of his wings, and his brilliant little throat spread to the utmost. Up and back in perfect arcs he would swing time after time while his demure little lady apparently took no notice of his efforts to please her. However, in about two weeks Mrs. Ruby-throat had fully rested from her travels and was ready to meet Ruby at his game of love and pleasure. With quivering wings and glad little chirps she met him on the clothes-line, and away they flew for a frolic far up into the blue heavens above. Two weeks more were given over to happy times among the flowers.

One morning Ruby folded his brilliant throat feathers and slipped away, leaving Mrs. Ruby in full possession of the garden where the daintiest of bird nests had just been started.

Some time in the far-distant past, experience must have taught the male hummers that their presence about the nesting site, dressed as they are in gorgeous shining plumes, only brought disaster, and they learned to keep away from the home.

However, he was never very far away, because almost every time that mother hummer got into any real trouble with a marauding crow, robber jay, or prowling house cat, Ruby appeared to help her drive the intruder away.

Nor do they waste any time in going. The bravest cannot stand against the tiny ball of fury whose wings whir with the resonant hum of a machine, whose voice is as the metallic contact of many needles, and who cuts about in circles and dashes too quick for any eye to follow.

In a sheltered nook among the trumpet vines a few wisps of debris were placed and held together on the branch by spiders' webs cunningly wound about them, and upon this foundation Mrs. Ruby began to add bits of cottony wool from the ferns and silk down from the compositae. After about a thimbleful had been so placed that it spread out, rounded at the bottom and flat on the top, Mrs. Ruby began to bind it in with spider webs, reaching from below to the top where she sat as she packed and worked the mass together, with bill and outspread wings. By the time a slight rim had

begun to appear the first egg was laid and two days afterward the second egg.

Two china-white eggs like twin beans, one-half inch long, extremely large for a bird less than four inches in length including outstretched bill and tail. From eggs so large in proportion to the mother, one would be led to expect precocious babies, babies able to run about and pick up their own living. But it is not the case with hummers. They are fliers only, and it takes from three to four weeks for their wings to grow to the flight stage.

Long before the eggs hatched, mother Ruby had built up a beautiful cup of down and shingled it copiously outside with lichens and bits of bark that served the double purpose of protection from prying eyes and destructive rains. Above it was protected by the brave little mother. After fourteen days of warm brooding, brother was born. Very early in the morning, I saw the mother standing on the edge of the nest absorbed in what was taking place inside; then I knew what the mother knew, and my heart was glad with hers. In the bottom of that downy cradle was the most marvelous bit of living flesh and blood in the world, kicking with all its tiny mite at the two halves of the shell which the careful mother removed as soon as she knew the baby was free.

ON THE FIFTEENTH DAY THEY WERE REAL BIRDS

He was a lovely bit of pulsating life of a creamy-pinkish hue, covered here and there with a translucent purplish skin. His head was large as baby heads are wont to be, but to me, as to his mother, he was a most wonderful baby.

When his sister left her pearly covering three days later, brother had almost doubled in size and weight. For a week mother Ruby was careful not to leave her babies long uncovered; she would dart away and bring a throatful of delicate young spiders, aphides or other soft-bodied insects, and gently, oh, so gently, place them well down in her darlings' throats. Seemingly she would feel about until the crop was found, when by a deft movement of her tongue the insects would be deposited where they would do the most good.

After the first week the twins fairly filled the nest, and their little bills, which had begun to elongate, were poked into the sides of the nest lining most of the time. It was now that mother Ruby stopped brooding them, and even at night, except in case of rain or cold, they slept alone.

When first born the gentle mother would hover over her babies until her feet found a place on the nest bottom, but now she could not even do that and stopped trying altogether. However, they did not need her; the nest was like a warm comforter about them, and, besides, they now had some fine pin feathers over their backs.

On the eleventh day they were the prickliest little animals imaginable, but on the fifteenth day all the feathers but those of the tail had broken out of their sheaths of quill and they looked like real birds for the first time. Every spare moment of the past three days had been spent by them in diligently picking off the scaly feather coverings. As was but natural, brother took the lead in trying out his wings, rarely giving sister any chance. He had also a little more color in his feathers than sister had, a hint of the glory of the future.

For several days he had climbed to the rim of the nest where he could use his wings with greater freedom. One morning—was it accident or purpose?—he lost the toe grip on the nest and was lifted straight into the air by his humming wings for almost four feet where he came to an overhanging branch, to which he clung for dear life all that day and the next. Another short perpendicular flight took him well up into the branches of the tree. When sister, duplicating his methods, joined him five days later, he could fly almost at will from branch to branch.

Before long Father Ruby joined his family again, and they played about the honeysuckles and other flowers from sunup to sunset. They loved best of

all the early morning sprinkling hours when they could bathe under the sparkling spray purposely stopped down to a delicate mist for their benefit. They thought it a far superior way to bathe than to have to wriggle about in the cement bird bath like other more common birds did while bathing.

Brother liked the overhanging broad blades of sweet corn where he would squirm about in the trough made by the large midrib, down which flowed a tiny streamlet of water collected by the sloping sides. He would glide back and forth with bill straight up then stop and sit back upon his expanded tail and carefully wash each feather of both wings.

TRYING WINGS FROM THE NEST'S RIM

Sister preferred the wide-spreading cabbage leaves. Where they curled over slightly little cups of water collected and in these she would whirl and dance about until sopping wet, squealing like a child in excited delight when passing through an extra deep pool. Then followed the rub-down in the sun.

What lovelier picture could one wish for than the one presented by this family of Ruby-throats as they turned and played on the large vegetable leaves in the garden, fairly swimming in the gathering moisture while shining rainbows chased them round about in the shimmering mist!

The Hummingbird's Nest

By Helen von Kolnitz Hyer

IT WAS on the coast of South Carolina in a bit of the swampy paradise for birds which we were most fond of exploring, that I chanced upon the daintiest sight in all the woods—a hummingbird building her nest!

April was three-quarters upon her journey to May time. As we followed the old, half-obliterated road past abandoned rice fields into the fresh, leafing woods, the wayside ditches were purple with wampee and violets; a delicate perfume proclaimed the proximity of jessamine flowers, and soon their blossoms rioted like beaded strings of sunlight from every bush and sapling near the edge of the swamp.

The trees closed in to form green cloisters and arcades of cool shade, lightened here and there with splashes of sunlight. Trailing Spanish moss hung in great masses from every tree and lured us on with visions of swinging nests of yellow-throated and Parula Warblers. Somehow, we did not dream of Hummingbirds.

Then as we reached one of the splashes of sunlight and thin woods, we caught the iridescence of flashing wings as Her Ruby-throated Majesty darted through the sunlight and poised on the swaying branch of a small water oak a few yards away.

For a moment we lost her; then we saw her again—on a tiny gray bit of the branch, just before it curved gracefully earthward. But as we found her she was off like a flash, only to return swiftly with a bit of gray lichen in her bill. Perching on the edge of the gray mound, she thrust her shred of lichen into the mass and pecked it into place with her bill. Then we realized that the gray mound was her nest, and we thrilled with excitement to see what would happen next.

With an almost imperceptible movement the graceful little lady settled herself in the hollow of her tiny gray home and whirled herself around and around, while her wings beat up and down, up and down, more swiftly than eye could trace, leveling the lichens into place and deepening the hollow where soon she would hide her two tiny white eggs.

Time and again we watched her fly off in search of more building material and then return to pat it into place with her wings, and oh, how we longed for our camera, inadvertently left at home.

Finally we went on our way, wishing her the best of luck and a family as dainty as herself.

Dogs of the Arctic Frontier

By OLAUS J. MURIE

U. S. Biological Survey

TODAY the eyes of the world are turned toward northern lands, where explorers seek undiscovered continents and new knowledge of the world. Who has not thrilled to the exploits of the far north; to the tales of the prospectors, trappers and the native Eskimo? Who did not follow the brave feat of carrying the life-preserving serum across the frozen miles of Alaska?

In all these experiences the dog has figured largely—the Eskimo dog or husky, the malemute of Alaska. The thrill of childhood days in reading these stories of the north has not ended in disappointment. I have found that the malemute loses none of his romance on closer acquaintance.

"Cheechakos" in Alaska are eager for a "dog ride," and old-timers of twenty years' experience have often fallen so under the spell that their hands itch for the handle bars of the dog sled when they are off the trail for any length of time. Among these are some expert drivers who have developed dog-mushing into a profession. This is especially true of the Nome country, where dog driving became a sport, resulting in great races and annual sweepstakes and producing a type of man comparable to the western cowboy. Indeed, it is thrilling to sit in a roadhouse of an evening, when the dogs have been fed and watered, and chance travelers gather around the stove to smoke and talk dog, each one extolling the virtues of his leader.

In the north country, where population is sparse or wanting entirely, and other draft animals cannot live, the dog has proved to be the only means of travel. The malemute has been praised by poets and cursed by many a prospector! When the snow is deep and the trail is heavy, when the dogs pile up in a free-for-all, or when they act just plain "ornery," mere words cannot express one's feelings, or, should we say, one's temper? The driver surely has murder in his heart many times on the trail. But when the day is ended, the dogs fed, and the dog-musher has under his belt some bacon and bannock and coffee—perhaps a chunk of caribou—the dogs are not so bad after all. They take on virtue when seen through the smoke of a comfortable pipe. Old Pooto is really not a bad leader and Jack is a faithful plug. The trail was bad, so the dogs couldn't be expected to do much better anyway. And twenty-five miles isn't so bad, considering the late start this morning. Yes; when all is said, the malemute is dear to the heart of the Alaskan. In fact, Alaska could not have been explored without the dog.

STEEP TRAIL AND DRIFTED HARD

Eagle Summit, Alaska, demands skill to keep the sled on the trail.

The origin of the malemute is a mystery. The Eskimo dog has been thought by many to be a domesticated wolf, modified for use as a draft and pack animal. But this explanation is not satisfactory in many respects. It is reasoned by others that the dog came to this continent from Siberia in company with the Eskimo. The Eskimo dog is described in the writings of various explorers as early as the sixteenth century at least, usually re-

ferred to as a wolf-like animal. This dog seems related to the Asiatic breeds, such as the Siberian, Spitz, Chow and Pomeranian. Some of the characteristics these dogs have in common are the prick-ears and the bushy, curled tail. Many of the northern dogs have a characteristic masked face, which, together with the curled tail, does not very well apply to a wolf. Considering all the evidence, it does seem reasonable to suppose that the Eskimo and his dog both originated in the northern part of Eurasia.

MOTHER AND BABE

Hudson Bay huskies taking a rest in the sun.

Nowadays it is difficult to find a pure strain of any breed of dogs in Alaska. "Outside" dogs have been brought in—wolfhounds, setters, great danes, collies and various mongrel types, until all conceivable mixtures are met with on the trail. Wolves also are raised and crossed with other breeds. The more or less pure Siberian dog is commonly used on the Bering Sea coast, in teams often numbering fifteen or twenty. This is a comparatively small dog, well adapted to travel over the crusted snow of the open tundra.

In the interior heavier dogs are used, weighing seventy or eighty and sometimes as much as one hundred pounds, and having long legs, for wading in the deeper snow encountered in that part of the country. Smaller teams are driven here, numbering seven to nine, although even in this interior country mail carriers and professional dog-mushers often drive thirteen or fifteen dogs.

Some men sing the praises of the bird dog — very speedy and willing, but not so hardy. Others swear by the "outside dog," a rather indefinite breed which includes dogs brought into the north from more southern latitudes. They are the workers, these men claim, willing and faithful. Another man will drive nothing but Siberians. "All right where you don't have deep snow," another will answer. Still others prefer the half- or quarter-breed wolf. All of which makes for interesting and animated conversation among roadhouse gatherings in the long winter evenings.

All types have their drawbacks and, after all, sled dogs can be placed in two classes, good dogs and poor ones. Some are good workers; others do not earn their feed, whatever their blood may be. For one who is going into far places, over rough trails and in bad weather, roughing it out of reach of the roadhouse, the original Eskimo dog has much to recommend him. He is variously called husky, malemute, or "siwash," sometimes contemptuously. Difference of opinion obtains as to what is a malemute and a husky. Malemute is evidently derived in some way from the name of the "Malemiut" tribe of Eskimo living in the Norton Sound district on the Bering Sea coast and is generally used now to designate the original Eskimo dog, as contrasted with the "outside" breeds or the Siberians. The whole question of classification in this case is very confusing.

OFF OVER THE HILLS

Versatile and willing, the dog will carry a pack as well as pull the sled.

For all his obscure ancestry, the malemute has a character all his own. One would sometimes think that he was created just to work and to fight — he

dearly loves both. In the morning when you begin to lash your sled, the dogs uncurl and stretch a little and are ready for the trail. The moment you begin to lay out the harness, how they leap and tug and howl to be loose, for they have been chained up for the night. Turn them loose and they are likely to come and poke their noses at the harness, eager to be hooked in. If you do not have a well-trained team you may have to tie your sled to a post or tree until all are in the harness, a leaping, howling pack, impatient to be off. The moment you free the sled, away they go with a joyful yelp, romping down the trail at highest speed, which soon slows down, however, to a steady dog trot lasting all day. Some dogs are pacers, a feature considered

SUPPER TIME

Cornmeal or rice cooked with tallow, rabbit or game are used when dried salmon is scarce.

valuable by the dog-musher, for a pacer has endurance.

The malemute likes to be in harness. There is bustle and excitement in it that appeals to him, "something doing." If anyone thinks it is cruel to put a dog to work, a little experience with a team would dispel the idea. I wish human beings could all be as happy as the sled dog on the trail! True, when the day is done and a camping place reached, the dog is just as eager to shed his harness and curl up to sleep. Make a little spruce bed for each dog in the snow, throw a dried salmon to him, and he is contented for the night. The dogs are fed once a day and will eat snow to slake their thirst. On well-traveled trails, where shelter can be had, the dogs are put into barns and given water as well as fish. But the malemute often does not hanker

THE HUSKY IN ACTION

"Oit! Oit!" the Hudson Bay Eskimo calls to urge his dogs on.

for such comfort. Sometimes, when I have chained him to a dog house, I have later found him lying on top of it, comfortably curled up, and exposed to a cold winter wind. His coat is heavy, with a warm under-fur beneath the outer "guard hairs," so he does not worry about the weather.

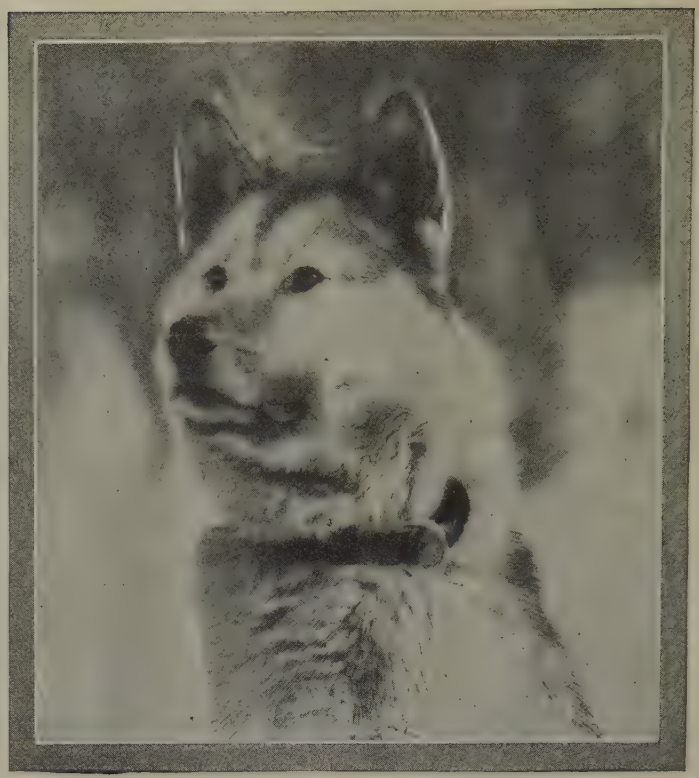
And how he loves a fight! A dog fight is at once thrilling and exasperating. There is always the chance that a dog might be really injured, else one could almost enjoy the excitement of it. If by chance two dogs have a difference of opinion and proceed to settle the matter, all their team-mates leap in to their assistance and a noisy melee ensues —a writhing, snarling, biting mass of dogs. And

IN UGLY MOOD

The Arctic dog dearly loves a fight and never has enough.

when, by dint of much persuasion with the butt of a blacksnake or a dog chain you manage to separate the contestants, they stand around in various truculent attitudes, a menacing rumble in their chests, ready to meet a fresh attack from any quarter. You untangle the harnesses, get the dogs back to their places, call out "all right!" and they will resume the journey and soon forget the recent battle.

They really enjoy a fight. I once had a little curly-tailed, prick-eared malemute with a grizzled face scarred by many a battle. In the morning when we started he would invariably work and pull in frenzied eagerness to get at the dog in front of him and would sometimes succeed in precipitating a fight. Usually in about five minutes his exuberance would work off and he could steady down to work.



JAKE—QUARTER-BREED WOLF

Unlike some with wolf blood, he was an untiring worker.

Another dog, a quarter-breed wolf called Snook, was very amusing. His tactics were wolflike—a dash in, a quick snap of the jaws, and he would jump away again. Once I took four dogs out to a spot where a moose had been killed, to let them feed on the entrails, as dog feed was very scarce. When I reached the spot I stood in the midst of the scattered offal with a whip to keep the dogs apart while eating. In an unguarded moment two of the dogs happened to reach for the same morsel, which resulted in a fight. Another dog promptly joined the pair. Snook, some distance away, came prancing up with a wide grin on his face and sailed into the fight. I shall never forget the happy expression on Snook's face at the prospect. And when, at the end of the fracas, each one slunk aside to lick his wounds, touseled and blood spattered, I knew that Snook would be just as eager at the next opportunity and was probably saying to himself, "It was a glorious battle."

Although it may seem that I have stressed unduly the propensity of the Eskimo dog to defend himself, it must not be supposed from this account that all malemutes are necessarily ferocious or dangerous. There are some bad ones among them, just as among other breeds of dogs, but as a rule they are docile with people, even playful if given a chance. The same dogs who fly at each others' throats in a free-for-all will wag their tails and lick the driver's hands in a perfect wiggle of delight if he walks through the team to pet them. Nor must it be thought that all dogs fight. The man who has a perfectly trained team, which never fights nor howls, and works as efficiently and smoothly as any circus-trained animals, looks with disdain on a "fighting team." But that is another story.

Winter time is the season when the malemute is at his best, for that is sleigh time. The sharp wintry air puts vim and energy into him. A brisk day's run on a good trail, a feed of dried salmon at night, a little bed of spruce boughs in the snow on which to curl up—then the dog is happy. And oh, yes, now and then a kind word and a pat on the head, just to make his tail wag!

The snowy months are not the only season of the dog's usefulness. Sometimes one has to make a journey over the hills or across the tundra in summer, when horses cannot be had. Then put a little pack on one or more dogs and one on your own back. The sourdoughs say that when you have dogs you are the biggest dog yourself, which is not far from true. I generally packed twenty or twenty-five pounds on my dogs, but forty or fifty pounds are sometimes carried by large dogs. This mode of travel has its disadvantages. The dogs are bothered with flies, they must be fed, and in warm weather when a dog comes to a nice cool pool of water, he is very apt to flop into it and perhaps lie down, regardless of the pack on his back. Yet many a prospector has traveled for months in the hills in this manner.

Much more could be written of the achievements of these Arctic dogs, of the wisdom and exploits of famous leaders, and of thrilling adventures shared by frontiersmen with their sturdy teams. Certain it is that this loyal companion of man deserves all admiration for without him much of northern exploration would have been impossible.

The Circus Elephant

By DALLAS LORE SHARP

IN THE Natural History Museum of Tufts College, Massachusetts, is to be seen all that remains on earth of Jumbo, Barnum's great circus elephant, one of the most remarkable wild animals ever brought into captivity by man. There his huge bulk stands, just as in life, and it seems as if the walls of the building must bulge and almost give way from the very look of pressure and the feeling of crowding size exerted by the hulking old monster.

Had there been no one with me I think I might have spoken to him, so familiar, so friendly did he look. And I had not seen him since I was a boy! He used to know me in the old days when his circus came to town. Many a pail of water I have fetched for him, and many a wink and knowing look has he given me in return. He was almost the whole show to me.

Jumbo had a peculiar way of looking at me, an understanding way, which, I think, may be the way of all interested elephants. I can feel to this day the kindly, penetrating eye of Jumbo *seeing* me, seeing all of me, through and through. He seemed to *look* me naked, body and soul. He knew my inmost mind, my intention before I had thought it out myself. And when he approved of me, when I knew that I could pass within the terrible circle of his might—under his belly, on his back, into the curl of his awful trunk, then I knew that all of my sins were forgiven, that my kingdom had come, for the Almighty, or Jumbo, was with me.

Explain it as you may, but Jumbo seemed a kind of Almighty to me. Yet he had the gentlest eye and the softest touching trunk. I can feel the tip of his finger-like trunk working around the edge of my ear and lifting my cap from my head, as if it were yesterday. I fear that the years, or my conscience, who knows, have made me too suspicious and fearful ever to trust an elephant to that extent again. I am sorry, too. But there are men who can.

PHOTOGRAPH INTERNATIONAL NEWS REEL

"JUMBO HAD AN UNDERSTANDING WAY"

"Many a pail of water I have fetched for him. He was almost the whole show for me."

I know of a certain surgeon, one of the most noted specialists in his field, who was recently called in to operate on the foot of a circus elephant. The great creature was in pain. It was an abscess in one of the front feet; and nothing had been found that relieved it. Matters grew rapidly worse. Trumpeting and swaying in pain, the elephant became nervous and excited, until even his keeper was afraid to approach him.

Then the surgeon came. Yes; he could relieve him. But did he dare? Dare! Did ever the true doctor in the face of pain or death ask himself if he dared? He came up to the dangerous patient, two of whose legs were chained to heavy stakes, and spoke to him. He showed him the knife, the cleansing fluids, the bandages, and told him it would hurt, but only for an instant.

And the elephant understood every word that was said to him. Or else he read the character and understood the friendly, fearless spirit of the man

before him. He quieted immediately. The doctor bent under the huge hanging head and told the beast to pick up his sore foot. As the ponderous thing came up and back on the surgeon's knee, the doctor felt a nervous tremor shaking the giant form of the animal; and as he washed the fevered, swollen spot, and reached for his lancet, he felt the sensitive finger of the long trunk curl about and lightly grip the hair on his bent head.

It was an awful moment. But the touch of the trunk was like the grip of a child's confiding hand. The knife shot like a flame of fire through the throbbing lump. There was a spurt of blood, a groan of pain, a quiver through the mighty frame, and then, as the easing, like a soothing wave, spread over the vast body, the trunk let go its hold on the doctor's hair, and lifted aloft, swung wildly to the loud shrill trumpetings of relief and joy.

I am no longer a schoolboy—except in heart. It has been ten years since I went to a circus. But I see the big show come in at the railroad station every year. I love the street parade. Eight dappled horses drawing a rumbling van is a thrilling sight to me. I like the polar bears. But most of all I hurry to the street to see the elephants shamble by.

Were I to join the circus I should want to be the keeper of the biggest elephant. If ever I come home a conquering hero, I shall come, riding all alone through the streets of my native town, on the sagging, heaving head of an elephant, with only an

"THE MIGHTY OLD MONARCH OF THE JUNGLE" PHOTOGRAPH INTERNATIONAL NEWS REEL

"The elephant looks at me out of the corner of his eye as if he had a deep secret he would tell me."

ankus in my hand to prove my complete conquest.

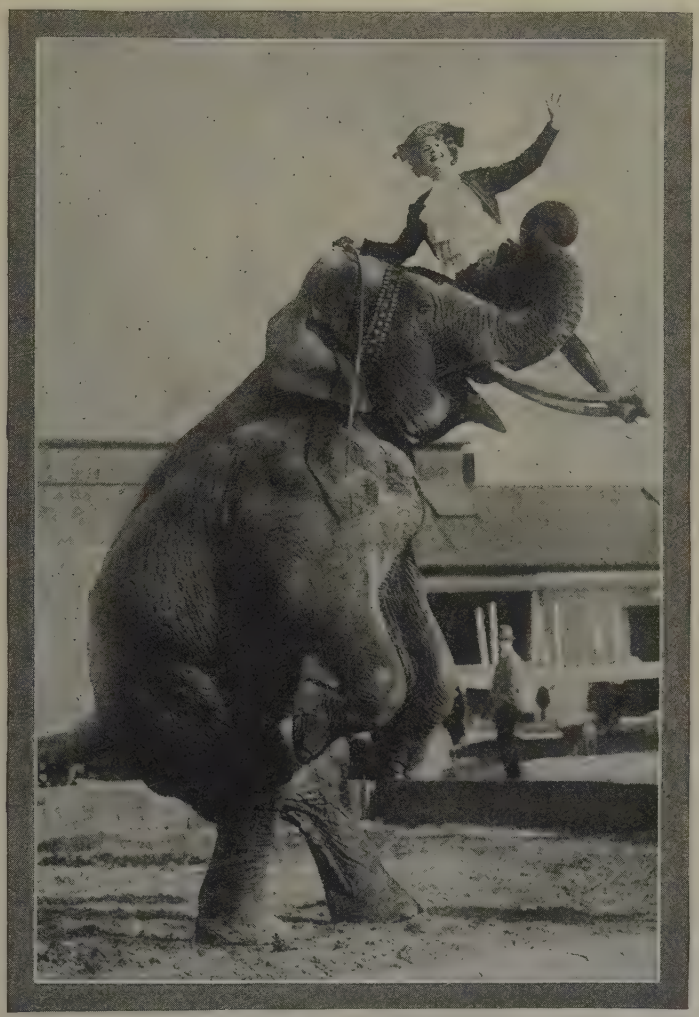
And I'm a grown man, a college professor, and talking like this! I confess it. And I confess that, to this day, every huge, hulking elephant rolling through the street in a circus parade looks at me out of the corner of his little eye as if he had some deep secret he would tell me, could I only come out to the big tent at the circus grounds and listen.

Perhaps I shall never know what the secret is. There is always a crowd under the big tent. Perhaps it is a jungle secret; and perhaps the look in his eye means: "If only we could escape from all of these people, and from all this noise and show and confusion, back to the wide, deep quiet of the jungle, just you and I, brother, I would tell you the riddle of life."

Before the days of Jumbo, there used to come every year an old elephant to our town, whose name I never knew, but for whom I have carried many a pail of water. He was a contented, good-natured giant, a very king to me, and I served him like a slave. On this particular May day the sun was hot, real jungle weather, and the mighty old monarch from the jungle was in the best of humor. But he had returned from the parade enormously thirsty. Bucket after bucket of water he sucked up as though they were only so many glasses of lemonade. It made me thirsty just to see him drink. And it made me thirstier to swing those heavy buckets across the wide circus grounds to the tent. All of which the elephant saw, and for all of which he was very sorry.

So, at last, when I had filled him up, and stood wiping the sweat from my admiring brow, that old rogue quietly sipped up the last bucketful, and swinging a little in my direction, blew the whole of it over me, drenching me most completely and most thoroughly, ducking me from head to foot!

And then he laughed. Perhaps an elephant can't laugh. But this one could. And I think he did. And then he squealed. Then all the other elephants squealed. And all the boys who hadn't been soaked squealed. And everybody in the big tent squealed in wild delight at sight of me, wet as a drowned rat! But I was cooled off now, and refreshed, and in no danger at all from sunstroke.



PHOTOGRAPH INTERNATIONAL NEWS REEL

"I SEE THE BIG SHOW EVERY YEAR"

"I should want to be the keeper of the biggest elephant."

But I didn't care. At least I don't care now, after these more than forty years. And I would carry water again, and run the risk of another ducking, if that were the only way I could get into the circus.

I knew most of the circus elephants in those days, but there was no other elephant like Jumbo. He was the biggest elephant that ever came to America, and the gentlest elephant, and the most intelligent, too. He was killed on the railroad many years ago; but thousands of persons still remember him, and the jaunts they had on his heaving back under the circus tent.

While he was still alive, and spending his winters in the circus quarters at Bridgeport, Conn., my friend, the animal painter, Mr. Alexander Pope, used to see much of him. One day he saw Jumbo do something which showed the elephant had not only intelligence but also patience of more than human quality.

Mr. Pope had been painting the lions that day and was crossing the yard when he came upon Jumbo helping to move some freight cars about the tracks. The circus people used Jumbo instead of an engine. All the big pachyderm had to do was to get behind the heaviest freight car and lean his head against it kindly, and that car would seem to know what was wanted of it and would roll off just like a baby carriage.

On this particular day Jumbo had been told to go down the track to a single freight car, which stood

in the middle of the yard, and push it along to one of the sheds. Lumbering down to the car, Jumbo swung in and looked the thing over. His keeper came up and spoke to him, Jumbo still studying his car.

It was a circus special, a high, heavy car of gaudy gilt and carving, but it was empty, and mere child's work for a real elephant. Why didn't they give him one to play with that was full of pig-iron, or loaded with about six blood-sweating hippopotamuses? And he warped himself about, as some vast ocean liner, came in behind, so as to push directly, and moving up close, lowered his head, and very slowly, very gently, leaned against the car.

He acted as if he were feeling for nails, so gingerly did he bear on. But this was his usual way; only this time he did not push a pound. At least the car did not move a single inch.

"Come, come," said his keeper, "get busy there! Don't try to *think* this car along! Get at the go-cart, and *push!*"

For Jumbo was thinking. However, he dropped his head a little lower and made believe to push. But the car did not start.

"Jumbo!" called the keeper. "Stop your fooling, you lazy lubber, and dig in your toes!"

Instead of digging in his toes, Jumbo wigwagged his big left ear, rolled a little wise eye around, and without budging, looked knowingly at the keeper. But the keeper was now impatient. There had been enough nonsense. And he said some quick things which Jumbo seemed to understand.

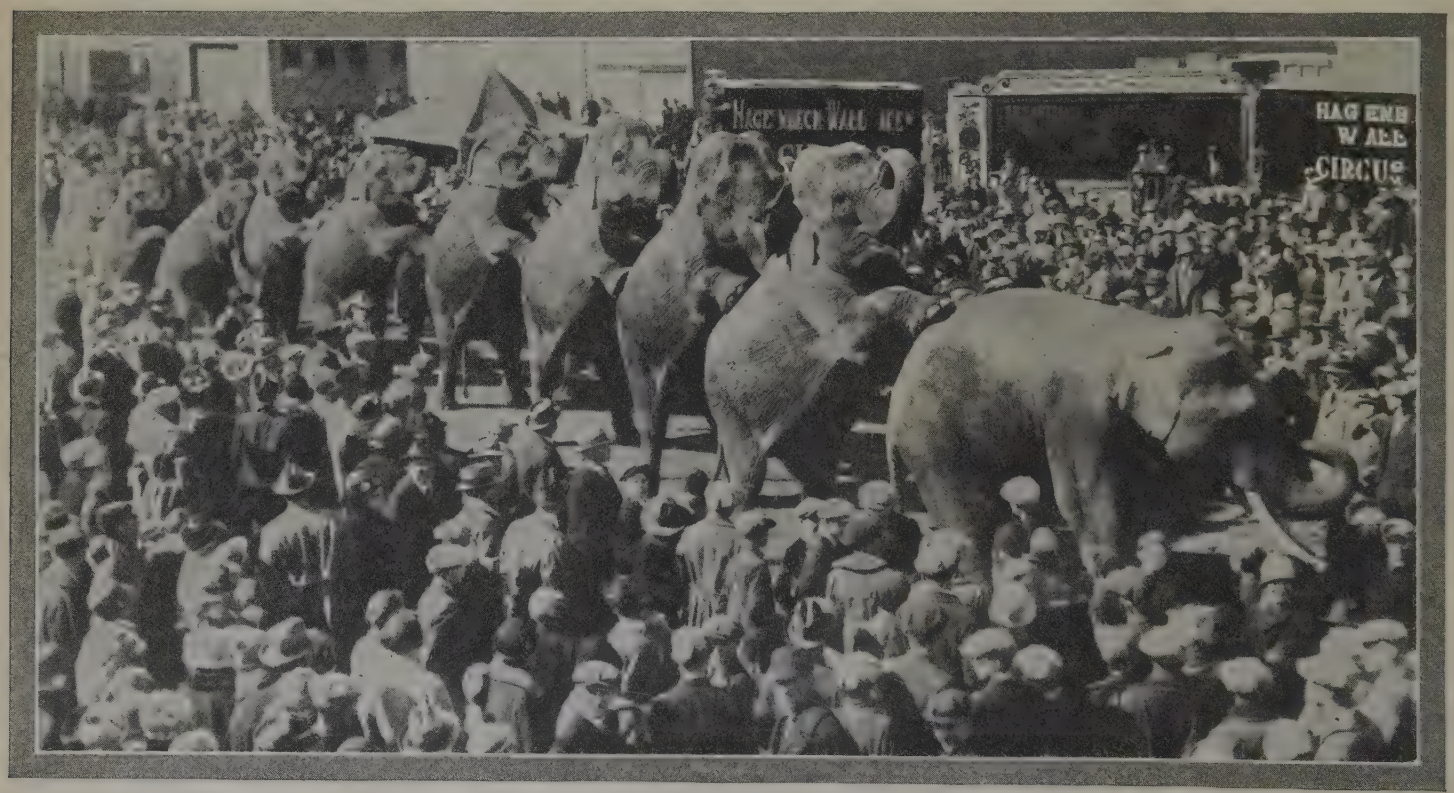
The great head dropped a bit lower down the end of the car. The heavy shoulders worked forward and up a trifle. The two tub-like front feet shifted just a little among the ties. And Jumbo really pushed, but not hard. The car did not stir.

What ailed the stubborn beast, anyhow! And the keeper, now thoroughly angry, stepped up to the flapping ears, and shouting into them, struck one of them a stinging blow with his iron hook, yelling, *"Push!"*

The blow of the iron hook was received without a quiver of protest, or any show of surly spirit. Jumbo knew now what he had to do.

Dropping his head still lower, all four of his weighty feet firm among the cross-ties, he bent forward, shoulders down, hips humped, and piling all his mountainous body up behind his head, he pushed. There was just an instant of suspense, when, with a splintering crash, his head went through the planking, as the whole gilded end of the car gave way.

Then the splendid creature drew back, pulled his head out of the wreckage, and swinging about toward his keeper, plainly said to him: "I told you so, you poor boob. Why didn't you know enough to take the brakes off that car!"



"I LOVE THE STREET PARADE" PHOTOGRAPH UNDERWOOD & UNDERWOOD

"But most of all I hurry to the street to see the elephants shamble by."

Shells, the Flowers of the Sea

By LOUISE REDFIELD PEATTIE

BARE is the Florida sea beach of foliage and flowers, but nevertheless here upon the dazzling sand are to be found beauties of every tint and twisted shape—the carven flowers that are shells.

Upon the beach of Sanibel Island, off the west coast, a walk along the long, white shore, blazing in the tropic sunshine, will yield treasure to the lover of shells. Who could but love them, seeing them strewn as a glittering floor, broken and sea-worn fragments, the mass of them. Among them are delicate and perfect treasures for him whose eyes are sharp and whose patience is long.

These big dark shells that look rather like high tortoise shell combs which taper to a point instead of being pronged are the Pen Shells. The outside is covered with spiny scales and is not handsome, but look inside and you will find soft tints. A brother to this is close at hand, the Prickly Pen Shell, also about six or eight inches long, and almost transparent in its paleness.

Here are cockle shells, beloved since nursery days. Varying in tints from clear yellow to salmon pink, purple or brown, they are deeply ribbed and serrate at the edges. When the cockle goes for a walk, he pushes out his one long foot, lifts himself up with a quick twist, and flops ahead several inches at one "step."

Then we find the scallops, ornament of design since ancient days, and in the Holy Wars the emblem of the Crusaders. Nothing on the beach offers more variety of pattern. Mottled or decorated with zigzag cross lines, they present every shade of red, pink, orange, and yellow. Lucky is the searcher who finds the most magnificent member of this family on the island, the "lion's paw," that by its appearance well merits its name.

A RANDOM HANDFUL

Reading down by rows: tiger's eye; coconut shell; clam; apple murex; cat's paw; scallop; jungle; ruffled murex; nutmeg shell; turkey's egg; scallop; left-handed whelk; ark shell and wee cockle.

The clam family is numerously represented. There is present the common solid surf clam, familiar from our Eastern Atlantic shore, and more delicate kin, faintly striped with purple or blue. There is another that seems but the very ghost of a clam, so paper-thin and white it is. And there is one lovelier still, called by common fancy "sunset clam," a long and graceful shell smooth as china. Its back is marked in a faint buff or lilac plaid, and in its interior it reveals a delicate splendor like the pink flush of a paling sunset. Its little, brown-mottled brother is popularly called "turkey's egg."

Now the treasure hunter may pick up a brittle brown shell and, wondering, open it to find within the exquisite surprise of fairy-like opalescence. This is the mother-of-pearl shell and what one holds in his hand is a relative of the Great Pearl Oyster that in farther tropic seas yields fabulous fortune. A cousin is *Avicula atlantica,* also pearly lined, but more graceful. Indeed, Avicula, or "little bird," is a fit name for these shells with the swift elegance of a swallow's wing.

Among the clumsy, box-like ark shells one passes by, the eye is caught and pleased by a handsome, brown-striped and ribbed member of the family, called by popular fancy "turkey's wing." And here is the shell named by some one with a swift imagination "coconut shell." He is a small but chunky rock oyster, white or stained with pink but for his faintly orange lining, and adorned upon his back with an array of recurved spines, very much as though he had been sprinkled with coconut. A close kin, nicknamed "jewel-box," is a tiny, pink fellow, like a dainty sea-fairy's casket. Anyone can see why this little flat shell is called "cat's

paw," for it is for all the world like pussy's pad with claws extended. This softly rosy, fragile shell is well called a "rose petal." The Pandora is as charming as its name, pellucid white and iridescent-lined. The "buttercup" is the joy of little girls "playing house" upon the beach, for it looks like nothing so much as a shallow cup of finest porcelain, with the rich yellow of melted butter painting the inside.

Among all these varied shells are scattered the ever-present little Jingles — sometimes called "toenails" — fragile-seeming little chips of translucent gold or silver or pink, that, when you have gathered a handful, clink pleasantly as you shake them. Ahead gleams a strange big shell, shaming all these tints with the purity of its white. It is an "angel's wing," washed up by the tide. Indeed it is celestial in appearance, and perfectly represents the long, stiff droop of the wings of the heavenly hosts. These mollusks are found in colonies, burrowed deep in sandy mud. A unique sport, indeed, to dig for "angel's wings"!

PHOTOGRAPH AMERICAN MUSEUM OF NATURAL HISTORY

ON THE FACE OF A SEA SHELL

A cameo of Reni's Aurora from the Morgan collection of shell cameos.

These are the most impressive of the bivalves, but the daintiest and dearest of all is the little Donax, or Wedge Shell. These gay little fellows, no larger than half an inch long, are of all the colors of the rainbow, bright as jewels and painted as butterflies, which they strongly resemble when spread open. Pink, coral, mauve, purple, green, yellow, fawn, and white, with varying patterns of rays and bands, they are an endless joy to the collector who may make of them many sorts of pretty articles, and even from the meat a most delicious soup. But you must be quick to catch them, for as you walk along close to the water, they feel you coming, and with a quick little wiggle they have burrowed into the sand.

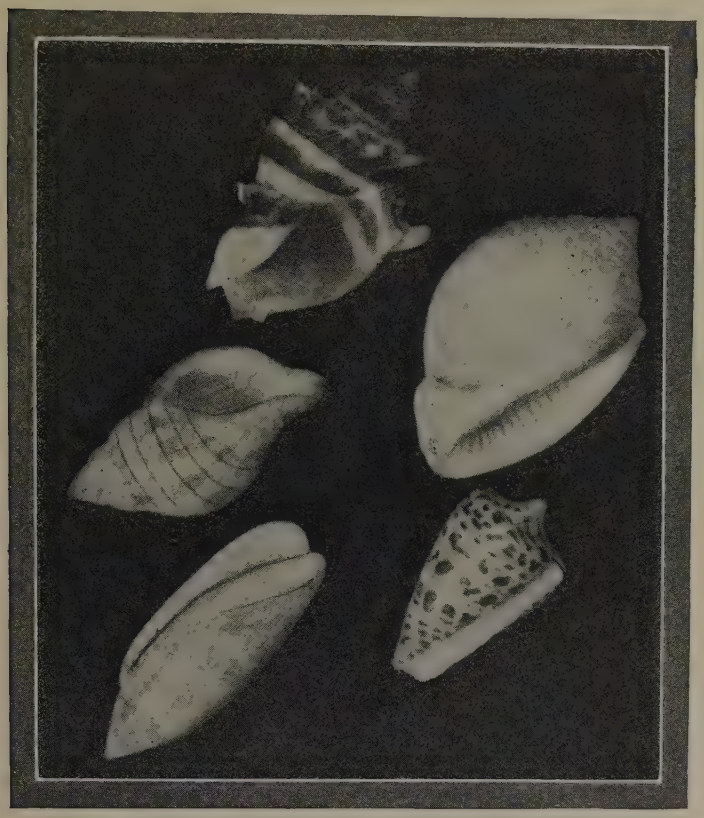
All these with which the shell gatherer has filled his pockets are bivalves or double shells. The single shells present an even more bewildering variety of form. Largest of all is the Giant Band Shell, one or two feet long, rough brown outside but stained a handsome orange-red in its lip. A less ponderous and more graceful species of this genus Fasciolaria is the Tulip Band Shell, patterned in close brown bands crossed with wavy lines of gray; still another variety is smaller and banded with clear, fine lines at some distance apart.

The tribe of Murex presents the most bewildering display of variety and peculiar shape. There is the Apple Murex, rough and twisted, grayish touched with chestnut; another is lighter and intricately carven as though adorned with sculptured ruffles, tipped with pale rose like a little pink snout; and here is one more, tiny and all a lovely coral.

After the richness of color and the elaboration of these shells, one is especially charmed with the discovery of a fragile, simple shell, shaped like a pear, fawn-tinted on the outside and a deepening brown in its interior, the whole so clear and paper-thin that one may see the light through it. This is the Paper Fig Shell, and one must marvel to think how these frail bits of loveliness ever survive the battering of the surf.

Another of more assertive handsomeness is the Fighting Conch. Along the sand one may easily find one of these strenuous creatures lifting and flinging itself forward, eager to return to the sea after it has been stranded by the tide. The polished lip is especially striking, painted a brilliant orange-red, shading back to purple and then pink.

What a contrast is the "lady's ear"! A Venus carven by Praxiteles might have an ear of such an exquisite curve, but the shell is finer than sculptured marble could be, and of a moonlike whiteness. How sturdy in comparison is the "Scotch bonnet," one of the Helmet Shells, with its plump, sweeping lines



SHELLS OF DISTINCTION AND BEAUTY
They are commonly called Crown Melongena, tulip shell, Scotch bonnet, olive shell and Chinese alphabet.

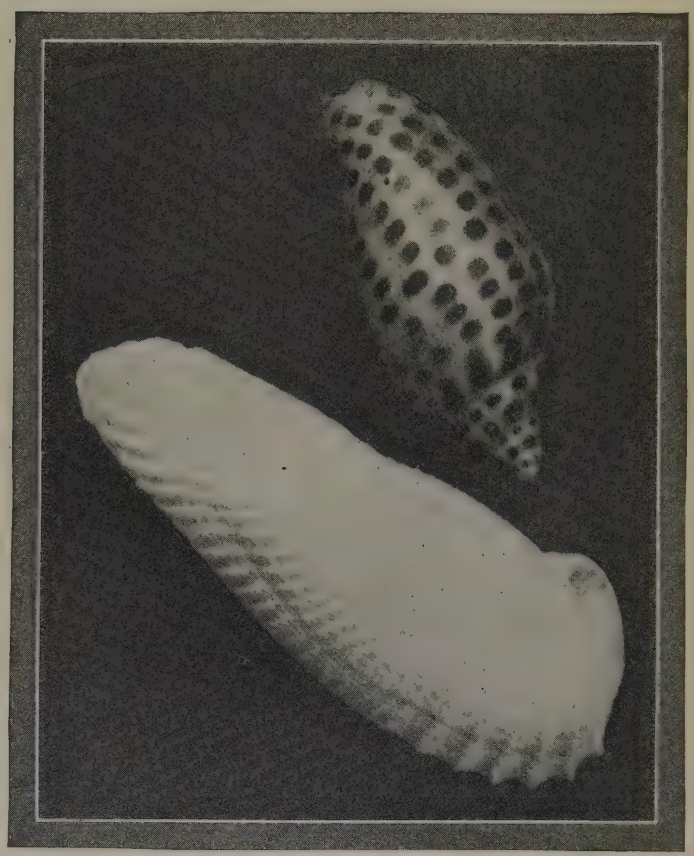
and pale fawn color spotted with yellow! Not so unlike this is the smaller "nutmeg shell," very well described by that name, though it does not suggest its rich chestnut shade.

The Cone Shells—none are more striking. They look like cone-shaped tops. Some are yellow, and some are white spotted with serried brown dots. It is inevitable that these latter should have been dubbed "Chinese alphabet shells."

Of the Moon Shells, here are two, both round and smooth, the "shark's eye" of a bluish, brownish tinge, whorling up to a fine spiral in its flattish center, that gives the effect of an eye. The "tiger's eye" is yellowish and striped. The Olive Shells are slim, tapering cylinders, delicately marked in pale brown on their creamy surface. They take a high polish.

Among all these, if you look closely, you will find tiny shells of endless fanciful variety, shells like grains of rice, or oats, or coffee; long fine white "tooth" shells, like some sea-beast's fang; shells like wee coolie hats; others like miniature oriental turbans; screw-shaped shells, shells like elfin tops and some like bubbles.

Now one picks up a fine big shell, darkly bright, banded and streaked with lightning streaks that radiate from the spire. It is a Whelk, handsome, indeed, but not so curious as many others. Yet look again. Now you perceive that it is oddly different from the other univalves upon the beach. The spiral turns to the left instead of following the right-handed fashion set by the snails. Appropriately the species is named *perversa*. These creatures live upon oysters and such bivalves, and they are in turn preyed upon by a handsome, devilish-looking whelk, the Crown Melongena. This shell, striped bluish and chestnut, has its whorls adorned with a coronal of spines, giving it a wicked appearance.



TREASURES OF THE SANDS
These are "Angel's Wing" and the rare *voluta junonia*

Strange and fascinating all these shells, the largesse poured out by the tide. Yet still the collector upon Sanibel beach sends searching gaze along the sand. For upon this island may be found that rare and handsome treasure of American conchology, the *Voluta junonia*. Digging in the sand at the shore line one may bring up the prize, vividly marked with giraffe-like spots. But not today did the shell gatherer find his *junonia*, nor yet in all his yesterdays. He still possesses the treasure of hope.

TIRED, dirty, with eyes that looked out through reddened rims set in grimy faces, with shirts and trousers torn and spotted with burned out holes, the men stacked their shovels and axes beside the barn. Wearily they looked over their shoulders toward North's Hill, blotched with a wide, black scar of stark trees. Scattered but subdued wisps of smoke curled up here and there but the fire was out. The pine and fir forest that mounted the hill to the west and sloped off toward the river had been saved.

For fourteen hours they had been battling flames leaping hungrily along the forest floor. It had been a dry summer, and the trees even seemed to lap avidly at the fire. It had started early in the morning, soon after the auto camping party had come down the hill trail from their night's stay. The early morning breeze had fanned it and given the flames a running start before Melville could muster enough fire fighters. It had been a gruelling day, and the half dozen men Ed Martin had asked to stop by his place for their first meal of the day were looking forward to Ma Martin's biscuits and the glasses of cool milk that had been all day at the well bottom.

"You don't look it, Mr. Haskell," said Martin, turning to the tall, slender man, whose khaki shirt and trousers still showed signs of newness despite the air-holes flying sparks had burned in them, "but you certainly know something about handlin' fires. Was you a fireman in the city?"

Haskell smiled with his soot-streaked face and shook his head. The men trooped toward the house. Haskell had come to Melville a couple of weeks before on a vacation. He had taken a room at Ed's, spending most of his time walking, mostly in the woods, coming back often with a handful of different kinds of leaves or pockets full of pine cones. He didn't talk much and many had put him down as "sort of up stage." Ma Martin liked him because he was a quiet relief from Ed, and Ed liked him because he was a good listener.

Ma Martin's dinner was as fine as usual. Plates were filled and refilled. All attention was given to the business of eating until finally Ed took care of the last piece of the last wedge of apple pie. The inner man abundantly satisfied, pipes lit and chairs back on their hind legs, the cloak of fatigue had slid away. Talk was in order, for it had been too busy for talk all day.

"You seem to know a powerful lot about trees," Martin said to Haskell. Ed's curiosity was aroused about this quiet stranger from the city.

"Well," said Haskell, "I'm a professor of forestry at the university."

"Forestry, eh?" Ed observed. "I've seen the word in the papers and heard a bit about it. Always seemed sort of high falluttin' and bookish to me."

"THE MEN STACKED THEIR SHOVELS AND AXES BESIDE THE BARN."

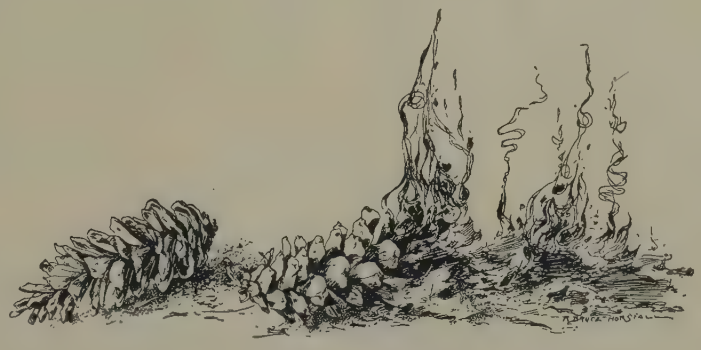
"Perhaps that has been a trouble in the past," Haskell replied, "but I think we're getting a different point of view. It's one of the most important questions in our country today."

"Should think it would be," cut in Mark Downs, the oldest man of the group. "When I was a boy this whole country was timbered; big trees, too. Now there's not much but that young stuff we was fighting in today

to save about the last real timber we've got around here, over toward the river."

"I wonder if you gentlemen realize," the professor went on, "that there are about 81,000,000 acres of land in this country that aren't doing a thing. They once grew timber. They are no good for anything else. And now they are good for nothing as they stand today. That tract over back of your place, Mr. Downs, represents twenty of those eighty-odd million acres. There used to be a good stand of softwoods on it. Now not even a self-respecting cow will graze on it. Still it could grow pines again."

"Yes, I own it. Been fighting every year with Sturgis here over the taxes," Downs said, nodding at the local tax assessor, who was nursing a burned cheek. "Thinks I ought to pay taxes on no 'count land."



"CAMPERS MUST HAVE CARELESSLY LEFT A FIRE."

"Classify it and put it to work, Mark," Sturges asserted.

"What do you mean? What good is it to me, professor?" Downs asked.

"Put the land to work again," Haskell replied. "Plant it to either softwoods or hardwoods. It's good tree land. There's a law in this state that allows you to classify that land for a small fixed tax so long as you grow timber on it and protect it from fire. Get the trees to coming back on it and in fifty years you'll have twenty valuable acres of timber."

"And I'll be pushing up daisies," declared Downs.

"The world isn't going to end when you die, if you'll pardon me, Mr. Downs," Haskell protested. "How about the two boys? Your father cut that land over to build your house. You used it until it wasn't worth farming. Perhaps you owe it to the future to put it back where it will be some good to your family and the community."

"Umm, that's true," was the response. "How about it. What will I do?"

"I'll go over it with you when you say," the professor offered. "The state maintains a nursery where you can get seedlings to plant. You're luckier in this state than some with your tax classification law, nursery and state forestry department. The department will give you all the advice you need, and I'd be glad to help you start."

"We'll make that a date for day after tomorrow morning, Mr. Haskell," Downs declared, banging forward on all four legs of his chair and hitting the table top between an empty milk pitcher and a pie plate. Ma Martin looked a bit worried.

"Good," Haskell said. He continued, turning to the rest of the men: "Reforestation is a big issue. We are cutting our remaining timber four times as fast as we are growing it. About 40 per cent of our original resources have gone and much of what is left is second growth. The Federal Government has acquired some 156,000,000 acres of national forest. The states have acquired some million acres more. Some cities and towns own forests. These are all being handled and cut like a crop to yield every year or so. The idle lands in these areas are being reforested. But it is something that must be done all along the line. You fellows with idle acres have got to get busy as well as the government and the owners of big tracts of loafing land.

"We've got a new law now called the McNary-Clarke Act. It provides for the states to cooperate with the Federal Government in protecting from fires, in distributing nursery stock, in devising good forest land tax laws. It plans extension of National Forests and transfer of government lands having timber on them to the partial supervision of the United States Forest Service. It's good fundamental forest policy. It will probably be extended as we go along and realize what must be done. But it's for you fellows to get back of it and help."

"Sure and you get your forest goin' fine and along comes a fire. Bingo!" This came from Dan Sullivan, the youngster of the fire-fighting party who ran the local garage and owned quite a bit of land that he let for grazing. "I'll bet a spare tire that that fire today was lit by those campers. I looked 'em over when they

"THE EARLY MORNING BREEZES FANNED THE FLAMES."

stopped by the garage last night. Didn't like 'em then."

"It probably wasn't lit by them," Haskell said, "but they must have carelessly left a fire and the morning breeze sent it scooting through the timber. In fact the majority of fires are the result of carelessness. A cigaret, a poorly put out camp fire and other human causes cost us and our children a lot every year. It cost whoever owns the timber on North's Hill a few thousand today and cost us a tough day's work. The only answer is to watch, to protect, to prepare and, above all, to educate the people to realize that others have property rights.

"Hundreds of thousands of acres are burned over every year. It means loss of lives and property as well as timber. This was a bad fire we had to fight today, but it was a brush fire compared to some of those in the great forest areas in the mountains. Fighting these means courage, resource and tireless working. Our government rangers are fine fellows keeping an eagle eye out for fire in all seasons and going bravely into battle against them. But they can't stop the careless fools from setting them.

"Many of the idle acres are the result of repeated burnings, mowing down the young seedlings that have come up by themselves until finally they haven't the courage to try again. Then the land goes on a permanent vacation. Take this tract on the hill. Probably half of the trees will come back more or less. Most of them will be scarred somewhat. Some seedlings will come up naturally, but if there are more fires eventually the tract will be as bad as Downs' twenty acres—worse, in fact, because it will be covered with burned debris.

"You know in many sections, even when the trees are cut off entirely, they will come back naturally if you keep the fire out. In others where no seeds are left in the ground the only way is to reforest—replant. On the farm you can make a woodlot out of waste. In the town you can make a town forest out of land that has reverted to the community because the taxes weren't paid or out of land the town owns. The state can acquire land to protect its streams and water supplies and, too, its landscape. The nation can set aside greater areas as reserves."

"You're right, Mr. Haskell, and we've got to get going mighty soon," said Phil Haynes. "I graduated in agriculture at the university. Took a course in forestry my first year—just a general course, you know. I'm afraid I've rather forgotten its importance and I've got a few acres that ought to be growing timber. I wonder whether you'd do the same thing for me you're going to do for Downs?"

"Glad to, Haynes," the professor said cordially. "If you're as good a farmer as you are a fire fighter you should be able to turn out a good crop of timber on the side."

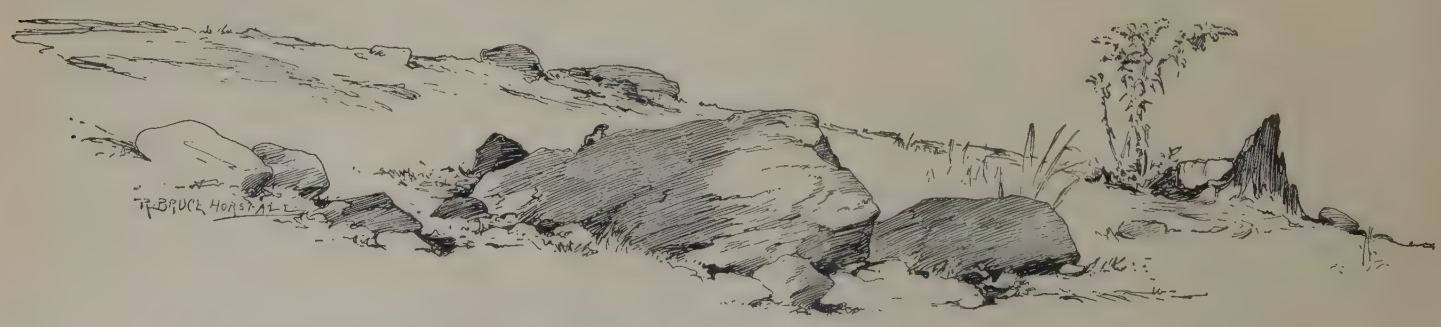
"Reforestation," Haskell continued, "means planting and protecting. All along the line we are beginning to try to check up on the waste of timber from the forest to the man who uses it. We've got to accomplish a lot and that means cooperation—not everyone getting together in a big meeting and shouting and saying 'I'll help,' but everyone going out in his own back yard and seeing what he can do—asking advice and taking it. It's everyone's duty to find out what forestry is and then applying it. It's not high faluttin', Mr. Martin; it's just plain ordinary horse sense."

The professor knocked out his pipe and observed that he hadn't felt so good and so tired since he rode the range in the Rockies. He was going to bed, by George, and sleep like a stevedore. It was a general signal for departure.

"My goodness, the professor surely did talk tonight, Ed," said Ma Martin, hanging up the dish towel.

"Horse sense, mother. Horse sense," declared Ed, locking the back door.

(Prepared by the American Tree Association; Republished from *Grit*, Williamsport, Pa.)



"THEN THE LAND GOES ON A PERMANENT VACATION."

Ungainly yet beautiful bird, the Heron has been chosen as the subject for the colored insert in the September issue of NATURE MAGAZINE. *Mr. Horsfall has painted a beautiful picture which will illustrate an equally fascinating story by Ben Hur Lampman.*

A Bit of Mantis Biography

By HOWARD TAYLOR MIDDLETON

(PHOTOGRAPHS FROM LIFE BY THE AUTHOR)

IT IS pretty well known among nature folk that the most voracious and grotesque of all the strange creatures to be found within the flowery precincts of the average country garden, generally where young evergreens abound, and especially in the southern states, is the praying mantis.

While the appellation of this tiger of the insect world is quite appropriate in so far as his characteristic posture is concerned (the attitude of mantis when at leisure suggesting supplication), I have found him to be much more ferocious than devout—and the wily celestial agrees with me on this! The Chinese take advantage of the fighting qualities of mantis to indulge their love of sport, for they stage combats just as dog and cock mains are held in other countries.

To witness a duel to the death, with saw-toothed swords as weapons, it is only necessary to stand idly by as two lusty warriors of the mantis clan settle their private differences in the same polished fashion as did ye brave knights of old. With dexterous sweep and lunge and parry, the dreadful fight proceeds even unto tragic victory.

Not only in battle is mantis a master, but of the art of hunting as well. I was once highly entertained while watching mantis stalk a spider. The latter, busy at the pleasant task of weaving a deadly mesh about a newly captured and still struggling cricket, had little thought for the grave danger lurking above him. The spider's nonchalance was easy to understand after witnessing the strategy of mantis. Upon the underside of a sloping frond of Spanish bayonet, mantis climbed slowly upward. So extremely deliberate was every stealthy movement of the stalker that it actually took him several minutes by the author's wristwatch to arrive near the tip of the blade. It was obligatory for mantis to gain this point of vantage because it was here that the web was attached, and the separate strand that always acts as the spider's telephone wire was within easy grasp. No sooner had mantis finished his tedious ascent than he reached out with a forearm (one of his saw-toothed swords when in battle), and touched the

MANTIS CLIMBING A STALK

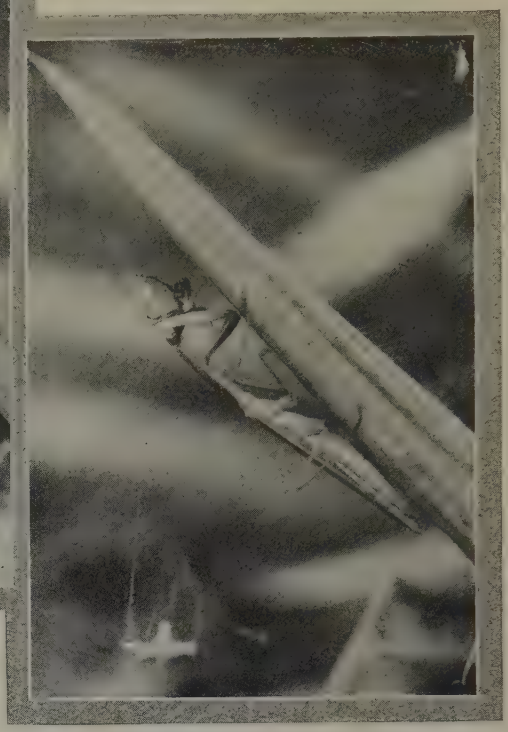
A FIGHT BETWEEN MANTES

The first photograph shows the challenge; the second a blow at the head; the third a lunge at the body, and a missed clutch for the head, and the fourth the victory, and beheading of the victim on the right.

strand. Immediately the spider, being thus warned of trouble from above, darted aloft to investigate. Immovable as a statue, mantis watched and waited until his prospective prey came within striking range. Then, with a movement quick as light, the victim was made prisoner — and devoured slowly alive.

ATTACK ON THE SPIDER

The stealthy approach of the mantis up a stalk of Spanish bayonet.



EATING THE SPIDER

After it has been captured and killed by the deadly forearms.

If insects are endowed with the sense of feeling, and let us sincerely trust they are not, I do not envy them the hideous ordeal of being eaten by mantis. He is never sportsman enough to kill his game prior to dining, but rather holds his wriggling captive between those terrible forearms and feasts upon the least vital portions first.

The most serious indictment, however, remains. Many creatures devour their prey while yet alive, and we are told that the female of the species is more deadly than the male, but what other female eats her mate? The male is the smaller and seems afraid of his spouse, but she reassures him, and the mating is accomplished. Then, if the fancy strikes her, she grasps him with those terrible hooks, and satisfies her hunger on his body, sometimes, however, allowing him to escape only partly devoured.

PRAYING MANTIS ON GERANIUM

This ferocious looking creature is called the tiger of the insect world.

In midautumn the female mantis lays her egg cluster, exuding a thick and creamy substance which quickly forms into a hard cocoon-like lump on the branch of an evergreen or other convenient shrubbery. When the sunny days of spring come again to the country garden, literally thousands of young mantes make their appearance, and this is a joyful sight to the *wise* nurseryman. No one knows better than he does that the creatures, being predatory, do no harm to vegetation themselves, but prey upon those insects that do. Hence their presence is not only welcome to the nurseryman but is also encouraged by him.

Delving into mythology a bit by way of finale, I might say that there have been many wild legends handed down through the ages regarding the mantis —one of them, selected at random, being to the effect that in those distant days beyond recall, mantis was of inestimable service to travelers who had become lost in the forest. According to this absurd tale, it was only needful for the bewildered wayfarer to ask the insect the route to the nearest town when mantis would promptly and obligingly wave his arms in the proper direction.

Rubber—Nature's Tropical Gift

By RICHARD WILBUR WESTWOOD

"ERSATZ?"

"Nein, nicht ersatz."

Wonderingly, with wide eyes, the little blond German boy regarded the "boots, hip, rubber"—as the A. E. F. requisition slip put it—in which we sloshed through the rain of Gros Gerau. Were they "ersatz"—substitute, fake, makeshift—or was there really that much rubber in the world?

War, cutting Germany off from the world's rubber plantations, had meant paper instead of rubber heels; steel bands and springs instead of rubber tires; substitutes for most those things demanding the use of rubber. Little Rudolph had grown up in a nearly rubberless country; in a period when it was a rarity, reserved only for the utmost demands of war. And here were boots of it, reaching clear to the hips; many boots on many men!

COURTESY U. S. RUBBER CO.

RUBBER TREE LEAVES AND SEED

Dark brown seeds are contained in light green pods, which burst, scattering the seeds.

When Nature planted the rubber tree in the tropics she endowed man richly. Man has grasped the opportunity; but come something to deny him this resource and he would sorely miss the myriad things of rubber that have become a part of his life. Rubber, soft, resilient and cushioning, is, indeed, somewhat typical of civilization.

There is romance in the story of rubber production—a story of taming tropical conditions, of the white man in the outposts of civilization, of adapting the trees that produce this valuable gift to cultivation. There is romance, likewise, in the rubber industry and the discoveries that have made this product of the tropics useful in so many ways, from pencil erasers (from which the English name of rubber comes) to balloon tires.

Just now the United States Department of Commerce has under way an extensive study of the rubber situation. Prices of the crude product have been soaring recently on the market, turning public attention to it. Preliminary reports by the Government show that the great bulk of the rubber plantations is owned by British capital, and American enterprise is being urged to enter more actively into the field in order that competition may be maintained.

But to return to rubber, or caoutchouc, as it is sneezingly known save in the English-speaking world. If they have thought about it at all, most people think that rubber comes from the sap of the tree just as does maple syrup. Instead it is a sticky, milky juice of the tree flowing through surface cells just beneath the bark. It is known as latex and nourishes the tree through the latex system. There are more than one hundred trees throughout the tropical belt encircling the world that produce juice that will make rubber. It is, however, a somewhat helter-skelter property. Some of the trees in the four groups generally credited with producing caoutchouc do not live up to the family tradition, while other outside plants do possess the property.

Volumes could be devoted to trees, closely related and remote, that produce rubber, so varied has been Nature's endowment. A quarter century ago the world drew its rubber from the native forests. Wasteful methods prevailed and the world commenced to roll about in horseless carriages with soft tires. Demand leaped forward with the encouragement of custom, discovery and invention. Thus the twentieth century has seen forestry principles

applied to rubber-tree plantations set out, rotation of crops invoked, and an agricultural order brought into rubber production that eventually must find its way into America's timber-producing areas.

In this process of "civilizing" Nature's wild rubber store, certain trees and localities stood out above others as best qualified to serve. To the valley of the Amazon and the commercially known Para rubber is generally accorded the palm for superiority. In the lowlands, hot with steam of tropic sun and river courses, *Hevea brasiliensis* prospers often to 60 feet in height and grows with two or three near relatives, all of whom are rich producers of rubber. Over much of Brazil grows a smaller tree that produces Cerea rubber when it has reached two years of age. In Guiana two species of *Hevea, guayensis* and *paucifolia,* provide the rubber yield, while the Pernambuco rubber comes from a small, drooping tree possessing a somewhat inferior rubber quality.

Much of the rubber coming into the United States originates with a relative of the breadfruit tree. This rubber tree is *Castilloa elastica,* native of Ecuador, Mexico, Colombia and Central America. This tree grows to considerable size in height and often reaches three feet around the trunk. It likes rich and wet soil of valleys, where it lifts its oblong large and hairy leaves above the rubber workers gathering the valuable juice of the tree.

On the other side of the world, in Malaya, Siam, Burma, Ceylon and other colonies and tropical states grows the rubber-fig, *Ficus elastica,* but the transplanted Para rubber tree of Brazil is the one that has made this section of importance in the rubber-producing world. Africa has its *Funtumia elastica* of the Ivory coast and the Congo, a tall, erect tree giving a kind of rubber known as Lagos silk. There are other lesser centers and other interesting trees, for Nature has widely distributed her largess of rubber.

Methods of cultivating rubber plantations differ as well as processes of gathering. In fact, they are still in a state of development, although tremendous progress has been made both in cultivation and in meeting problems of life and industry in the tropics.

As a general rule a rubber plantation is created much as a forest-tree plantation would be. Nurseries are maintained for the production of seedling rubber trees, raised from seed. The seed of the Para rubber tree, which may be accepted as the most truly representative of its large coterie of fellows, is a mottled brown, somewhat like a chestnut though larger. It is enclosed in a pod and drops out as the hull cracks. In the better plantations care is exercised in selecting the seed for the nursery.

Luxuriating in tropic climate, the youthful trees sprout quickly and are soon ready for transplant-

RUBBER WHICH LOOKS LIKE CREPE PAPER COURTESY U. S. RUBBER CO.

Coagulated with acid it is pressed into sheets that would fool the housewife buying tripe.

COURTESY U. S. RUBBER CO.

YIELDING NATURE'S WEALTH

A tapped rubber tree showing incision made into the bark.

ing. In rows to about two hundred trees to an acre the leafy sources of our rubber supply climb upward, and in the case of Para rubber are ready to produce their first small crop at the end of five years. Meanwhile care has been taken to keep down weeds and to cut out the trees that do not live up to the promise of the seed.

Its first quintet of summers won, the tree is about twenty inches around at three feet from the ground. It then can start to serve and can go on serving for several decades if the good nature of the tree is not imposed upon by too much tapping or by disease allowed to attack it from lack of care. Tapping is, then, an important episode in the life of the rubber tree. It is a science that the natives have long practiced and in which they have gained remarkable deftness. It is also something about which the cultivator is still learning.

A daily call upon the rubber tree and wide slashes upon its skin is giving way to alternate tapping and more restricted slashing. Tapping is an early morning act, beginning at daylight and stopping by nine in the morning. A thin shaving of bark is taken off diagonally across a varying part of the tree's circumference with a sharp blade like a farrier's tool. It requires deftness and care, for a cut too deep exposes the tree to disease and one too thin impedes the flow of juice. There are variations in tapping incisions but they all seek to reach the valuable latex to free it so that it will gather in the porcelain cups at the lower end of the incision. The properly tapped tree will heal quickly, but just how long plantation trees will live and yield under scientific and careful handling is still in the realm of conjecture. Time has not yet been long enough to allow conclusions.

Once the rubber tree had yielded up the gift that Nature stored within it, man turns his inventive genius to transform it. From the porcelain cups the sticky fluid is emptied into milk cans, dusky natives gathering the run under tropic suns, much as far north Vermonters gather maple sap under the cold blue of an early spring sky.

For the market the Para rubber is prepared in several forms. The more crude method of making "biscuits"—rich brown, sixty-pound biscuits of crude rubber—still prevails somewhat, particularly

COURTESY U. S. RUBBER CO.

GATHERING THE RUBBER

It runs into poreclain cups and is gathered from these.

NATIVE LABORER ON AN ORIENTAL PLANTATION COURTESY U. S. RUBBER CO.

Tapping the rubber trees requires great deftness and women are skillful in harvesting the store of milky juice.

in Brazil. A wooden paddle dipped in the fluid, held over the smoke of burning leaves, dipped again and again, gradually acquires its rubber biscuit.

Newer practices, however, have improved the handling. There are three main forms of preparation, smoked sheet, thin pale crepe and thick pale crepe. The first looks for all the world like the good old black molasses candy. It has its thickness of about a quarter inch, its rich blackness and shiny surface, but it smells something like bacon. It has been coagulated by a smoke bath and on it the various plantations generally stamp their particular brand.

The thin pale crepe is about the thickness and color of lemon-colored flannel. The thick pale crepe would pass for tripe in any company with its lemon tinting and half inch thickness. A chemical, usually acetic acid, is used to hasten coagulation and the heavier mass, after straining and mixing with the acid, is milled and pressed into one or the other of the crepe forms. After a brief drying it is ready to be baled and shipped off to the myriad factories waiting to turn it into tires, tubes, bathing caps, erasers, rubber bands, balloons, and a thousand and one other things.

Although it would take volumes to tell of the myriad processes for manufacturing rubber, the story of this gift of Nature would not be complete without mention of its history. Columbus is said to have found native Walter Johnsons tossing around balls of rubber in a game of their own devising. French explorers of early days made special studies of rubber. Nevertheless it was regarded mainly as a curiosity for a long time. Native products came from the colonies in South America and haphazard experiment went on in several Latin countries. It was in England, however, that the first success at manufacture was won, and an interesting page in Nature-economic history written.

After failure of a patent in 1771 for waterproofing cloth with a thin layer of melted rubber, and the collapse for want of proper machinery of an attempt to weave strips of rubber, Charles Macintosh, of Glasgow, in 1823, obtained a patent and started making cloth with rubber between two layers of fabric. He gave his name to this type of material and so it is known today. About the same time Thomas Hancock was experimenting and making successfully articles using the elasticity of rubber.

Early attempts to manufacture rubber in the United States were made during the first forty years of the nineteenth century. They were not very successful, although Nathaniel Hayward, experimenting with the rubber stock in a Woburn, Mass., factory that had failed, worked out a process of mixing rubber with sulphur and treating it with acid gas fumes. Charles Goodyear, of Con-

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necticut, had previously figured out a similar method but neither were entirely satisfactory.

Goodyear purchased the Hayward rights and set about to devote his fortune and his life to taming rubber. It is told that he had made a mixture of rubber with sulphur and was discussing it with friends one cold night in the kitchen. A piece of rubber in his hand hit the red-hot door of the kitchen stove. It stuck to the stove and hardened without melting. Goodyear excitedly got a knife, scraped the lump from the stove, and washed it. He had discovered vulcanized rubber and forged the link that connected rubber with the thousands of uses it has today. He died financially discredited, but west of the Allegheny Mountains there grew up a great industry based fundamentally on his discovery.

The use of rubber has been expanded. It has been introduced into many products, refining them and improving them. It is now an essential part of our lives, as is the wood from the forest, the coal from the earth, the ores from the mines. Nature stored her wealth of gifts to man in many strange places. This bounty that she gave into the keeping of tropical trees is not the least strange or valuable.

Thunder Makers of the Tule Marsh

By WILLIAM L. AND IRENE FINLEY

Of the National Association of Audubon Societies

(PHOTOS BY WILLIAM L. FINLEY AND H. T. BOHLMAN)

THE GLASSY waters of Malheur Lake in southern Oregon reflected the midsummer sun hot in our faces. The long line of the distant tules floated between the surface and the sky. As we pulled steadily, they finally came to earth as we drew nearer and the mirage shifted on into the distance. Suddenly I heard a muffled roaring sound. I looked around expecting to see black clouds rising from the south. Another peal of thunder followed rapidly, and then another. As

AS IF HE WERE PREACHING TO A CONGREGATION OF PELICANS

I looked, I saw a big white pelican, patterned in black and white, tobogganing out of the heavens like a meteor, leaving a trail of thunder at his tail. In a little while, half a hundred big pelicans had curved down above a little bay, dropped their big webbed feet and skidded along the surface and came to anchor as light as corks and riding like a fleet of sailboats.

We had reached pelicanland. Along the southern border of this wide alkaline lake, the winding waters flow in and out between many tule islands. The strong buoyant roots of these clubrushes grow along the surface and support plants that are eight or ten feet high. The rushes die down in the fall, making a matted mass like a haycock. Here the white pelicans tramp down the tules and make their homes. We had discovered a real Venice on the floating islands that front on broad streets of water.

Camping among the pelicans had its difficulties. There was no dry land. We were heavier than the birds and the floating foundation of tule roots moved up and down as we walked about. It was like walking on a thin surface of ice, for at times it broke through. That night we selected a stack of tules for a bed, soft and three feet above the surface. We got up at daylight, because the bed had settled to the water level.

The marsh with all its mysteries has no other sight to compare with the white pelican. He is a primitive bird. The fossil forms of his ancestors have been discovered in the sedimentary rocks of the Tertiary times. The white pelicans of today, both male and female birds, have a horny growth on the upper part of the bill during the early breeding season. This looks like the center board on the bottom of a boat. No one knows just what it is for, unless it is a relic of the Miocene Age. Each year during the breeding season it loosens and drops off, just as the antlers of a deer are shed.

NOTE THE BLACK FEATHERS ON THE YOUNG PELICAN'S WINGS

Also the large skinny bag on the lower part of his bill, which he uses as a dipnet to scoop up fish.

As I sat in a blind built of tules in the suburbs of this big pelican city, I had good chances to study the inhabitants. The white pelican

THE FLYING PELICAN BACK PEDALS SO AS TO LAND AS EASILY AS POSSIBLE

The white pelican weighs from fifteen to eighteen pounds with a spread of wings of eight or nine feet.

is much larger than the brown pelican. He has a body weighing from fifteen to eighteen pounds, with a spread of wings of eight or nine feet. His short legs, long bill with an elastic pouch hanging from the under side, his kinked neck with the vertebra formed so he cannot keep it straight, may

COASTING ALONG ABOVE THE PELICAN VILLAGE

Sometimes these big birds fly so low that those on the ground have to duck to avoid having their heads cracked.

seem grotesque in appearance; yet as I saw an old pelican sitting with his chin resting on his chest, he had the appearance of age and dignity. The fact that he sits like a judge and says little, leads to the conclusion that there is a deal of wisdom in his old white head.

The pelican's large skinny bag hangs from the lower part of his bill. When stretched, this fish-basket holds several quarts of water. When not in use, this sac is contracted so it occupies very little space. The white pelican uses this as a dip-net. He swims along and scoops up his fish. It was formerly thought that this pouch served to convey live fish swimming in water to the little pelicans at home; but as Audubon remarked long ago, it is doubtful whether a pelican could fly at all with his burden so out of trim.

A baby pelican is very different from the nestlings of ducks, geese and wading birds which are able to move around and hunt food a day or so after they are out of the shell. The little pelican is naked and helpless like a new-born robin, and has

to be carefully nursed and fed by the parents. Gradually he gets a coat of white down, but it takes about a month and a half before he can move around and mingle with the neighboring birds.

The first time I ever saw a motley crowd of half-grown pelicans, I thought Nature had surely done her best to make something ugly and ridiculous. It was a warm day and the birds stood around with their mouths open, panting like a lot of dogs after the chase, their pouches shaken at every breath. When I went near, the youngsters tottered off on their big webbed feet with wings dragging on this side and that, like poorly handled crutches. The youngsters huddled together by hundreds in a small place. Those on the outside pushed and climbed to get near the center. It looked like the roughest football scrimmage I have ever seen. I watched one large bird rush for the center, bucking over three or four others and finally landing astraddle the neck of another. As I went closer, those on the outside began to circle the ends, and around and around the whole mass revolved as it moved off.

YOUNG PELICAN WITH A PORTRAIT SMILE

The baby pelican is naked and helpless like a new-born robin, but gradually he gets a coat of white down.

One might wonder how such a huge billed bird as the pelican could feed a helpless chick just out of the egg. It was done with apparent ease. The old bird regurgitated a fishy soup into the front end of his pouch and the baby pelican dipped in and helped himself out of this family dish. As the young bird grew older and larger, at each meal he kept reaching further into the big pouch of his parent, until finally when he was half grown, it was a most remarkable sight. The mother opened her mouth and the whole head and neck of her nestling disappeared in her pouch

THESE SUBJECTS HAVE NEVER BEEN PHOTOGRAPHED BEFORE

But nevertheless they pose for the photographer and adopt the "look pleasant" smile as if being "snapped" was a daily experience.

while he hunted for his dinner in the internal regions.

One day as I crouched down in a blind, there were several hundred young pelicans scattered through the colony. A pelican mother soon dropped into the nursery and was besieged by two ravenous children. Each began pecking at her bill, trying to make her feed them; but she moved off in apparent unconcern.

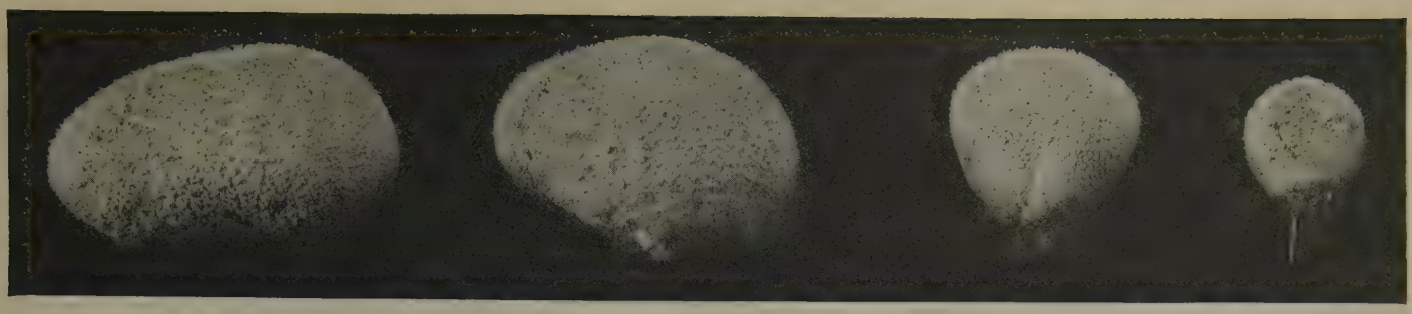
She waddled about for five minutes, when one of the nearly grown youngsters approached and began a series of actions that was very interesting. He fell on the ground before the old bird, grunting and flapping his wings as if he were in the last stages of starvation. As the mother did not heed his entreaties, the young bird suddenly got well and began pecking at her bill. The old bird backed up as if she were getting a good footing and slowly opened her mouth to admit the beak and head of her young. She drew her neck up till the ends of the upper and lower mandibles were braced against the ground and her pouch was distended to the limit. Jonah-like down into the mother's throat went the head and neck of the child, till he seemed about to be swallowed, had it not been for his fluttering wings. He remained buried in the depths for about two minutes, eating everything he could find. Nor did he withdraw from the family cupboard voluntarily. When the supply was exhausted, or the mother thought he had enough, she began slowly to rise and struggle to regain her upright position. The young bird was loath to come out and flapped his wings, hooking one over her neck. He tried in every way to hold on as she began shaking back and forth. The mother shook around over ten or twelve feet of ground until she literally swung the young bird off his feet and sent him sprawling over on the dry tules.

THE FIRST FLYING LESSON OF A YOUNG PELICAN

The young bird stretches and practices flapping its wings many times a day before it has grown strong enough to take the air.

For a few seconds the youngster lay dazed. Then, as if coming to his senses, he went raving mad. I never before witnessed such a show of temper in anything but a badly spoiled child. He whirled around once or twice, grasping his own wing in his bill, shaking and biting it. Then seeing one or two other young birds standing near, he plunged headlong at them, jabbing to right and left with his beak, while they retreated out of his way. By that time, wrath spent, he fell sprawled out and slept in the sun.

Every day after breakfast came the pelican promenade. The birds swung higher and higher until the eye lost sight of them. In an hour or two they were back, coasting earthward on rigid, half-closed wings with a roar like that of an approaching storm. They are real thunder makers of the tule marsh.



OHIO PUFFBALL

Rounded, about two inches in diameter, densely covered with soft, white spines, which turn yellow and fall away with age, exposing the smooth shining, yellowish or brownish skin. The flesh changes from white to clay-yellow or olive, and finally to pale-brown with age, but never becomes purple. This is said to be the most common puffball in many parts of Ohio, occurring in old pastures and open woods, and even in cultivated grounds. It is abundant in the southern states as far north as Virginia and Missouri.

Meet the Puffballs

By DR. WILLIAM ALPHONSO MURRILL

Of the New York Botanical Garden

EVERYONE who has trodden the fields knows the lowly puffball, which, when dry, emits a puff of smoke, as if in angry protest, when stepped upon. This smoke is largely composed of spores, which correspond to the seeds of higher plants and are so minute that ten million is a conservative number for a single puffball of average size.

Puffballs are the safest of all the edible fungi for the beginner, none of them being poisonous; and they are at the same time excellent and easy to obtain. Being tender, they cook quickly and are easily digested. They should, as a rule, be cut open before cooking to see that they are not too old and that they are really puffballs. If they are white and firm like cream cheese inside, showing no yellow or brownish discoloration, they are of the right age to use. If the interior shows no special structures, but is smooth and homogeneous, then one may be sure he has a puffball. The "egg" of the deadly amanita contains the young cap and stem inside, which is readily seen when the "egg" is cut; and the "egg" of the stinkhorn shows the stem and a green mass inside surrounded by a layer of jelly-like substance. Both of these "eggs" also grow underground.

Puffballs may be cooked alone in various ways, or used in stews and omelets, and for stuffing roast fowls. When used in omelets, they should be stewed first. All kinds except the very small ones should first be peeled and cut into slices or cubes, after which they may be fried quickly in butter, or dipped in beaten egg and fried like egg-plant, or cooked in any of the ways recommended for the ordinary mushroom. The smaller kinds are usually inferior in flavor to the larger ones and need a few specimens of some good mushroom to make them attractive.

COMMON FIELD PUFFBALL

A large species two to six inches in diameter with a smooth, whitish-gray or brown skin, which is tinged with pink or lilac when young and becomes purple and cracked with age. The white flesh becomes yellowish and at length purplish-brown as the rounded, spiny spores mature.

This excellent puffball occurs commonly throughout most of the United States in open grassy ground where the common mushroom is found, being often picked for that species by mistake and thrown away. Cows are very fond of it.

A method of cooking the larger puffballs which I like if I am not in too much of a hurry is to cut them in slices half an inch thick; dip these in yolk of egg; sprinkle them with a mixture of chopped herbs, pepper, and salt; fry quickly in fresh butter; and serve at once.

The plant that produces the fruit-body which we call the puffball lives in the soil or in decayed wood in the

form of slender, widely spreading filaments similar to those found in mushroom spawn. The fruit-bodies appear on the ends of thicker cords that rise to the surface of the ground when sufficient nourishment has been stored up and the weather is suitable. There are no gills formed as in the ordinary mushroom, but the young puffball simply grows larger and larger until of mature size and ready to ripen its spores.

Important changes now take place within the fruit-body. The flesh, which has been so white and firm, becomes flabby and goes through a sweating process, then changes to yellow, olive, or purple, and finally becomes dry and powdery. Millions of ripe spores are produced, intermingled with elastic threads that assist in pushing the spores out of their prison chamber through one or more breaks or openings in the skin.

As a group, puffballs are usually rounded or somewhat pear-shaped in form, white or nearly so when young and fresh, becoming yellowish or purplish with age, and covered with a soft skin, which may be either smooth or spiny. There is one very rare species that is orange in color; I have found it growing in the dahlia beds at the New York Botanical Garden. Hard-skinned puffballs and earth-stars, belonging to different groups and easily distinguished, are not considered here.

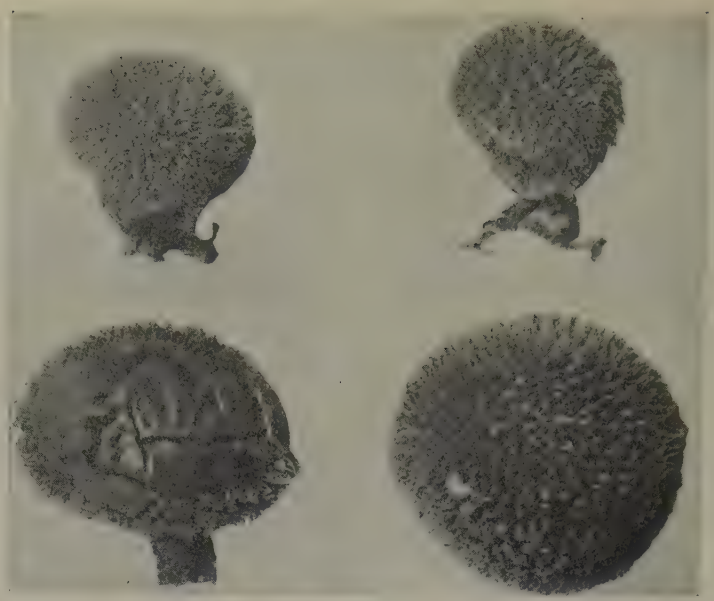
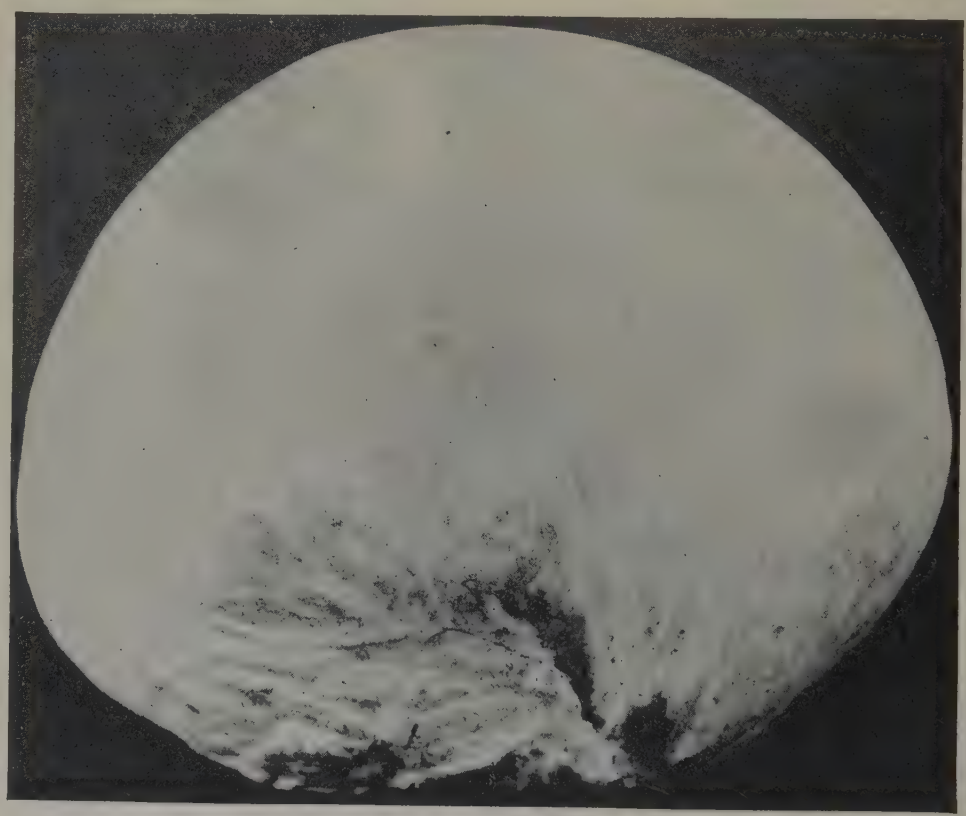


PHOTO BY MR. C. G. LLOYD

BEAUTIFUL PUFFBALL

This species is two inches in diameter, and shaggy in appearance, due to a dense covering of very long, white or light-colored spines, which fall away in age. It is also attached to the soil by an unusually thick cord resembling a tap-root. The flesh is peculiar in being decidedly fragrant when young and fresh; with age, it becomes at first olive and then brownish-purple in color. Although widely distributed in the United States, it is nowhere abundant and not of the first rank as an edible species.

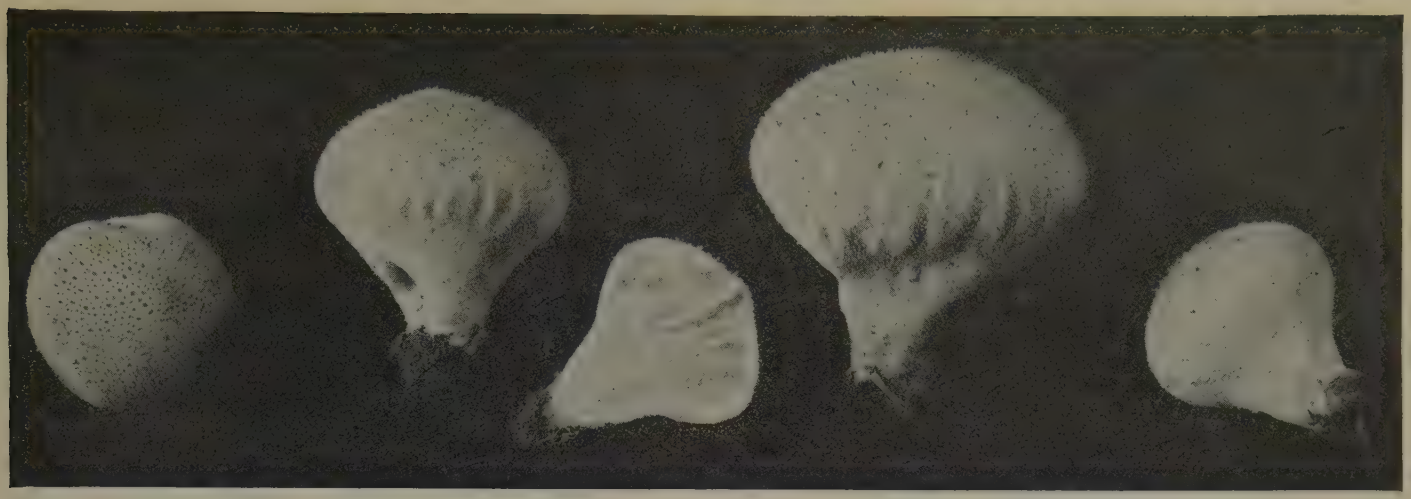
The species included in the accompanying pictures represent four groups, or genera, known scientifically as *Lycoperdon, Calvatia, Bovista,* and *Bovistella,* the first containing by far the greatest number of species. In most puffballs a small mouth is formed at the apex at maturity for the escape of the spores, and the sides collapse like a bellows to force them out into the air, where they are caught up by the wind and blown for great distances.



GIANT PUFFBALL

Before the days of matches, the fibrous interior of mature giant puffballs was used as tinder to catch sparks from flint. The surgeon also used this material to stop the flow of blood, and as a sponge; while the farmer found it useful to burn under bees while robbing their hive. The spores have been used in making various shades of brown paint, and also for mixing with milk as a medicine for calves.

In the large species included in *Calvatia,* there is no apical mouth, but the skin is ruptured at several points and finally breaks into fragments. It would be too much to expect all the spores in a giant puffball, for example, to get out at one small opening. In the "tumblers," belonging to *Bovista,* the



GEMMED PUFFBALL

A small, white species one to two inches in diameter, shaped like a top and narrowed below into a stem-like base. It is recognized by its covering of erect, pointed, wart-like gems, mostly pyramidal shape, which fall away with age, leaving scars. The interior of this pretty species is milk-white, becoming olive and finally brown with age. The gemmed puffball is abundant in all parts of the world, usually occurring on the ground in the woods. It is generally solitary or in groups. Appearing in July, it may be found as late as October, and few species are of better quality or more satisfactory for the table.

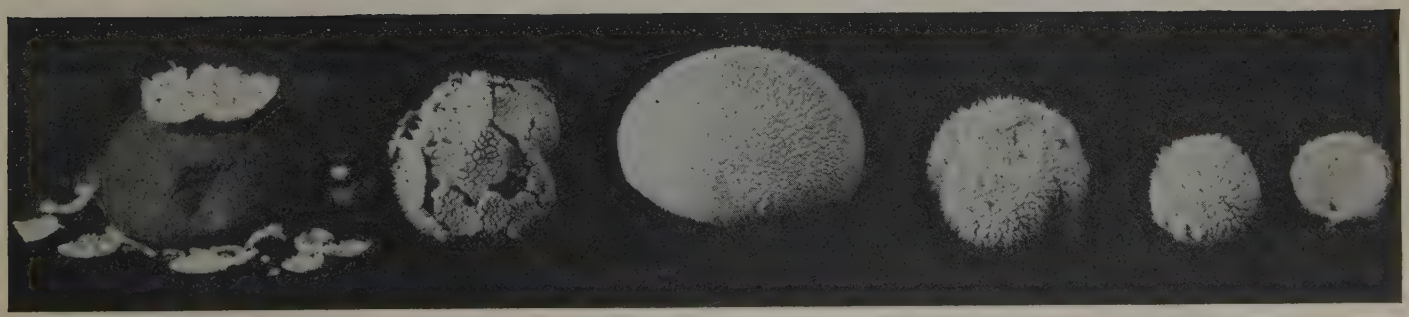
BELOW

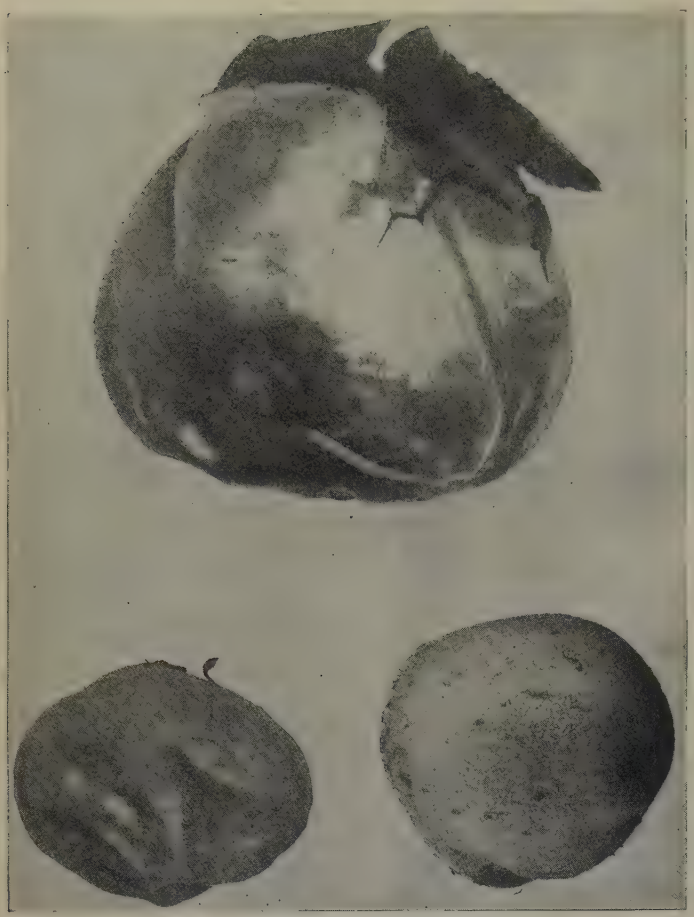
SEPARATING PUFFBALL

A very small, rounded, white species about an inch in diameter, densely covered with spines that peel off in patches, exposing the buff-colored or brown inner skin. The interior is white at first, becoming dingy-olive and finally brown, but never purple. It is very common throughout the United States, except on the Pacific coast, occurring in great numbers during summer and autumn in pastures or other grassy places and reminding one at a distance of a collection of white marbles of various sizes scattered upon the ground.

DRIED GIANT PUFFBALL

The largest of all the puffballs and readily recognized by its size and smooth, white, rounded appearance. The flesh is white at first, changing to bright-yellow and finally to dingy-olive with age. This puffball has the distinction of being the largest of all the fungi, attaining at times a diameter of three feet and weighing as much as fifty pounds. The plant is distributed throughout the world in grassy places in woods or fields.





BALL-SHAPED PUFFBALL

Round like a ball, two to four inches in diameter, white when young and fresh, changing to brown, purplish-brown, and finally to almost black as it matures, fading to gray and becoming smooth and shining in old specimens. The flesh is white, changing to olive and at length dark-purplish-brown. The species occurs in open woods or fields throughout the northern United States from coast to coast, and is of excellent quality when in proper condition. After the spores are mature, the ball becomes dark-colored and shining, rolling and tumbling about the fields before every gust of wind.

PEAR-SHAPED PUFFBALL

A small, pear-shaped, dingy-white or brownish species one to two inches in diameter, resembling the gemmed puffball in size, shape, and internal characters, but differing decidedly in the warts which cover its exterior. This is the commonest of our puffballs, being abundant and widely distributed throughout the world in dense clusters on old logs and stumps, and rarely on soil rich in humus. It may be found from July to November, or later.

skin is firm and tough and does not collapse, but the fruit-body breaks away from the soil at maturity and rolls or is blown about for years, perhaps, before all the spores are shaken out of the single, irregular month. Nature has devised many ingenious ways of scattering plants over the surface of the earth as students of botany well know.

Several interesting and useful species belonging to the four groups mentioned are here figured. The illustrations are in nearly all cases my own, having been made from specimens collected during many years in the immediate vicinity of New York City.

In the September issue of *Nature Magazine* will be found richness in article and illustration of outstanding attractiveness. William L. and Irene Finley have an entertaining article on that interesting bird, the California Murre. The pictures are beautiful, as always. A new writer, Lorene Squire, contributes the wonderfully illustrated story of a Prairie Dog. Captain J. Menander follows up his article on the Sargasso Sea with more about the denizens of the deep.

Shooting a Hobby

Being the Story Told by an Editor of NATURE MAGAZINE

"GREATEST hunting trip I ever had." Enthusiastically the hunter, browned and eyes glistening from days of reflecting the sun, slipped into the chair opposite the editor's desk. "Golly, think of it, I shot a dozen quail, seven kinds of ducks, three deer, one horned owl, one woodpecker and a mockingbird. Got the last one while he was singing and you should have seen his tail flick."

Picturing the destruction, the editor gasped for words of protest. The intrepid hunter went on.

"I've got them all out there in the hall. Pull down the shades and I'll show them to you."

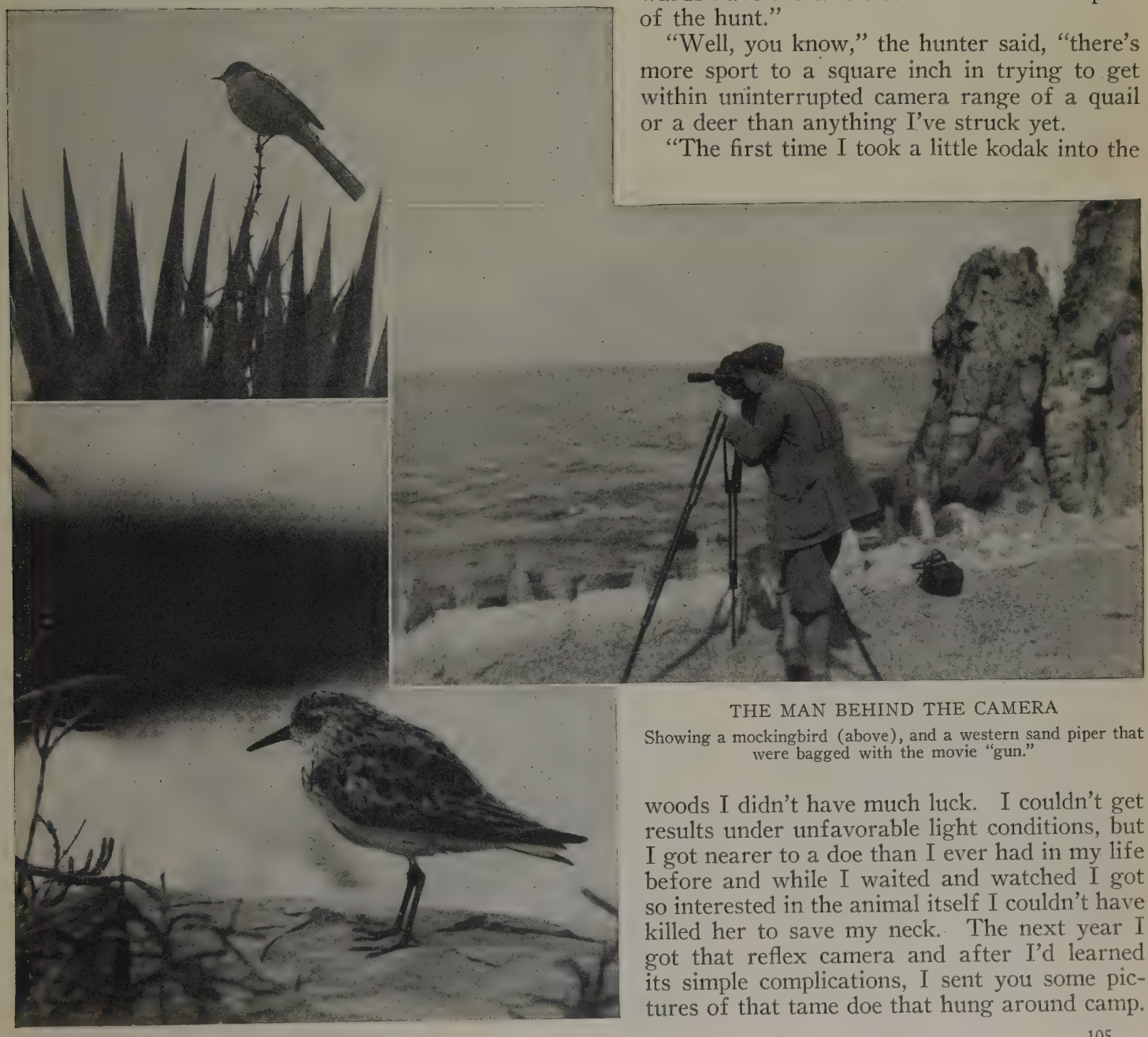
The hunter popped out into the hall and was back in a minute with a small black suitcase in one hand and a long black case about the size of a gun case in the other.

"Here they are," he declared.

Then the editor smiled. So that was the kind of shooting that had been going on! Shooting with a glass gun-sight and celluloid film for ammunition. "Sit down and tell me about it," he told his visitor, "then we will go out to lunch and afterwards have the whole staff in to see the spoils of the hunt."

"Well, you know," the hunter said, "there's more sport to a square inch in trying to get within uninterrupted camera range of a quail or a deer than anything I've struck yet.

"The first time I took a little kodak into the woods I didn't have much luck. I couldn't get results under unfavorable light conditions, but I got nearer to a doe than I ever had in my life before and while I waited and watched I got so interested in the animal itself I couldn't have killed her to save my neck. The next year I got that reflex camera and after I'd learned its simple complications, I sent you some pictures of that tame doe that hung around camp.



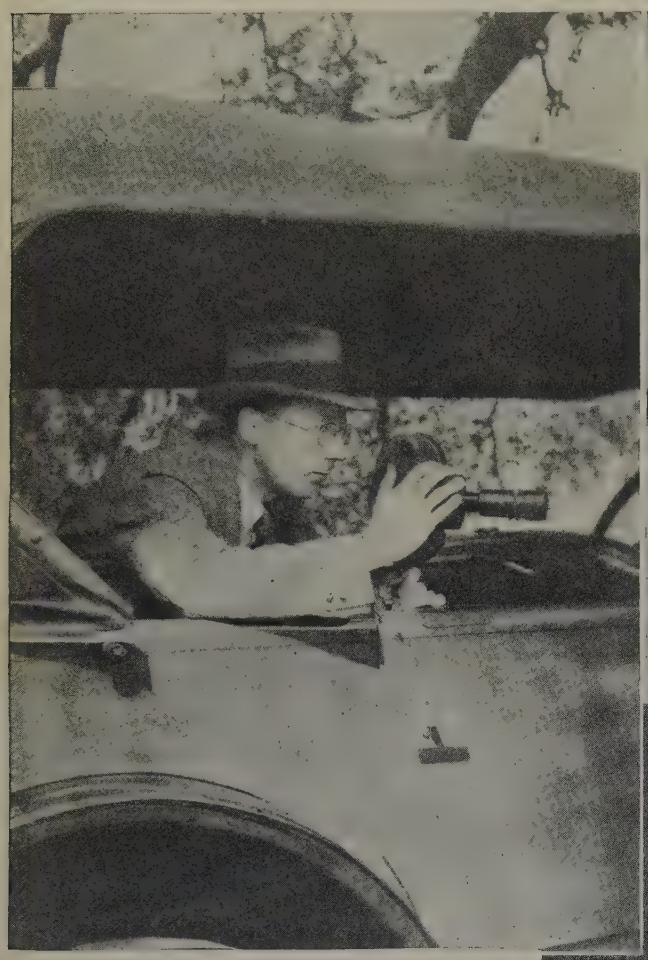
THE MAN BEHIND THE CAMERA

Showing a mockingbird (above), and a western sand piper that were bagged with the movie "gun."

Most of the pictures you use in NATURE MAGAZINE are that sort, aren't they?"

"Yes," the editor replied. "Most of the pictures that are up to our standard are made with that kind of equipment. But some of the particularly good ones with sharp detail and depth of focus, good for a full page, are made with a bellows camera mounted on a tripod. Time exposures taken with a small stop give the sharpest detail of all. It's a fact that perfect pictures seldom just happen. They are the result of the patient, trained work of a professional who is happy when he gets one real prize picture from a dozen shots. Of course, the time exposure method is not suited to moving objects.

"You know the Finley pictures we have in the magazine. Well, William L. Finley started out when he was a youngster to amass the more than 20,000 negatives he has. Every year he adds a few more wonderful ones. Finley might have followed his father's footsteps and built up more of a bank account, but he was infected with the germ of shooting wild life with a camera. He's happy



A HANDY SHOOTING BOX

Above (right) is the serious-looking California screech owl, fair game for the hunter. To the right the baby sparrow hawk acts a bit shy at appearing in the films.

SHOOTING WITH A TRIPOD

doing it because he's a master of his line and keeps his family going with it, too."

"I can well imagine it," the hunter said, "but I've got a new hobby that seems to me to beat them all. It's movies. Why it's no trick to learn at all and it's infinitely less expensive than it used to be. Of course, I don't use standard size film, mine is the new 16 millimeter noninflammable product. You know that the principle of movies is a series of still pictures taken at the rate of about 16 per second and shown at the same rate. Well, each picture on the 16 millimeter film is a quarter the commercial size and that cuts down the cost and still gives you results which, except for regular theater showing when the distance to the screen is often over a hundred feet, are just as good as you can ask for. Then they develop your film right into a positive so you don't have the extra printing charge.

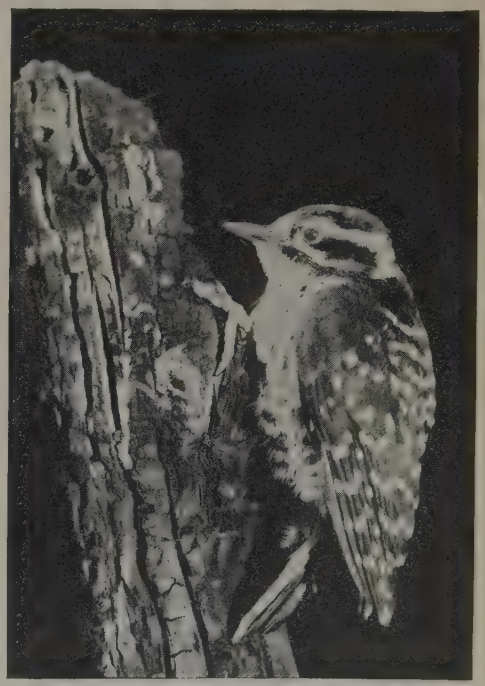
"There are already several motion picture cameras within reach so far as cost and ease of operation goes. After you've made your pictures, showing them is about as easy as going through a photograph album. See that black case, like a portable typewriter. That's the projection machine and the long box is my silver screen. Set it up on a table, thread in the reels of film and away you go to a movie show without more ado."

JACK IN THE FILMS

Antelope rabbit stars in the movies.

"Why do you find it so much easier with a motion picture camera?" the editor asked.

"Simple enough. Each separate picture is so small—only about three-eights of an inch by half an inch—that for a great many subjects focusing is unnecessary. Yet these tiny pictures enlarge wonderfully when projected, as I'll show you after lunch, for a screen up to six or eight feet square. My portable screen is about four by five feet. You don't have to bother with constantly adjusting your shutter speed, either, because it is constant and controlled by the rate of cranking. In the spring- or motor-operated machines this cranking is done automatically. So all the shooter has to do is to center his picture in the finder and get the diaphragm in accord with light conditions.



THE WOODPECKER POSES

"The ordinary hand camera doesn't permit working under very unfavorable light conditions. Even the best reflex cameras usually have a maximum lens speed of f4.5. This f4.5, you know, is an index of the ratio of the size of the lens to the focal length and determines the amount of light admitted to the lens. There has recently been developed for motion picture cameras using the small film, a lens with speed f1.9, several times as fast, making it possible to take well-timed shots even in deep woods. This means everything to the Nature photographer whose subjects are so often met early in the morning or late at night.

SHOT WITH LENS AND FILM

(Above) The dignified Cooper's hawk. (Below) The kangaroo rat.

"For my part, and, I guess, for any Nature lover doing bird and animal work, I find the greatest satisfaction in the telephoto or long-range lens attachment without a bulky outfit. You can't be a bird lover without field glasses and you can imagine how often you'd like to have a photographic record of what you see at the top of a tree or the far side of a forest glade. Well, a telephoto lens usually has to be very large and consequently awkward to use, but the smaller the actual picture the easier it becomes. All I have to do is to screw out my regular lens and finder, put in this one which you can see I can easily carry in my pocket, and there I have a photographic field glass. For a fact, with a six-inch lens I have made some fine shots of a hummingbird thirty feet away. It brings a deer a hundred yards away near at hand."

"How about the camera?" the editor interrupted. "Isn't it a nuisance to carry?"

"That's just what it is not," his visitor replied. "I know every Nature camera shooter has at one time or another groaned under the weight and bulk of his big reflex or his fifty- or sixty-pound outfit of a commercial size movie camera, tripod and all. But this little filmo fellow of the 16 millimeter variety weighs as little as four and one-half pounds and doesn't bulk any more than a 3-A folding kodak. If the camera cranks by a spring or motor good pictures can be taken by holding it in the hands, but it is true that the best results are obtained with a light folding tripod. For long-range work with the telephoto, a tripod is necessary because every slight movement is several times magnified in the photography.

"Many's the time I've driven along in my automobile and seen a mockingbird singing on a fence post or a deer near the forest edge and wished I could get a shot at them. By the time you've stopped the car they have departed. This spring I bought a sort of swivel-table clamp arrangement with a screw to hold the camera intended for amateur kodak users. I rigged this up on the robe rack of the Flivver and there was my camera with a long-range lens ready for instant use. I speeded off to try it and returned in an hour with some mighty good shots of one sparrow hawk, a pair of killdeer and some shoveller ducks that had lit near the edge of a tidal lagoon. If I'd tried to get out of the car, they would have recognized me as a human being and been off like a shot.

"For a long time I'd been trying to get a good shot at a road-runner in the Southwest. I'd seen them many times scooting along the desert and never had much luck. Then I tried this shooting from the car and was successful the first time. Conservationists condemn the business of gun hunt-

ing from an automobile, but this is O.K. There are no rules or seasons for the camera hunter.

"Into that little four and a half pound camera I get 100 feet of noninflammable, sixteen millimeter film. That's equivalent to 250 feet of standard size and it gives me ammunition enough for anything and everything. I've rigged up a corner of the cellar and spend spare evenings cutting out poor shots—we all get those—and cementing the good ones. With cut-out letters on a grooved board I can photograph my own titles."

An hour later the magazine staff had gathered in the big office. "Now," said the hunter, "here's the best of it. See that cormorant winging in to roost. He flies so fast you can hardly see his wings, but I shot him also with a superspeed camera, no bigger than my other one, but it takes 128 pictures per second instead of 16." On the screen the bird again appeared, this time moving his wings slowly and leisurely. The editor suddenly exclaimed and the girls began to laugh. "Did you ever see such strange contortions? He's backing water so as not to overshoot his perch. Look, how peculiarly his wings twist! If that isn't Nature study at its best I don't know what it is. Wouldn't an aeronautical engineer like to see that?"

The scene changed, for an instant a white-winged scoter bobbed in the path of an oncoming wave. Then he dove, and was gone. "Now see just how he does it," said the hunter. A flick and again the scoter appeared below a high and slowly curling crest of foam. Nonchalantly he faced the audience with his back to the oncoming wall. Then as carelessly he thrust his head into the sea, up ended and sank while the wave broke into a thousand silvery bubbles that floated across the screen and only gradually fell to reveal the diver once more going casually about his business beyond.

The hunter grinned. "I've only had the movie bug for three months and I'm rather stuck on that."

The Heath Hen Faces the End

By Bernard Peterson

MASSACHUSETTS has by force of unfortunate circumstances become heir to the gravest responsibilities for a species of bird life which is on the verge of becoming extinct. The heath hen was once so plentiful that the country swarmed with this game bird, resounding with its strange booming, and some New England tables were set with its meat several times a week. All along the Atlantic coast the heath hen seemed to thrive, but as civilization advanced the bird retreated, growing rare everywhere and completely vanishing from every section except the island of Marthas Vineyard in Massachusetts. There the bird took its final stand for existence, fluctuating in abundance as its enemies multiplied or dwindled from year to year.

Only a few years ago it dawned upon the ornithologists and upon the Commonwealth of Massachusetts that the tendency was inevitably downward, thinning the flocks at times to the border line of extinction, for it is now well known that there are no heath hens left in any other part of the world. Radical measures were taken by the state to save the hen. A large reservation on the island was acquired and protection for the bird established. In the course of about ten years Massachusetts has spent about $56,000 in various attempts to avert the tragedy of extinction, but despite all its efforts the bird is losing ground, and so far as anybody knows there are only eight heath hens left.

Now, what is to be done? The New England Federation of Bird Clubs has come to the rescue with some definite propositions. The Massachusetts Fish and Game Protective Association has joined in the program. Their immediate course is to raise at least $2,000 and establish extra guard at the island. They have already sent a woodsman down with a commission to exterminate the vermin, especially the marsh hawks and the wild cats and to save the hens from exposure to unscrupulous hunters. He will stay there throughout the summer, patrolling the reservation and the surrounding fields daily, and probably will be engaged later to remain until next March. His work will supplement that of the state warden and reservation superintendent. A specialist from Pennsylvania, loaned by the state, is coming to give Massachusetts the benefit of his experience in vermin control. Ornithologists and bird lovers from near and far are offering help to save this bird.

Word from the island that some young chicks have been seen, or heard, is anxiously awaited. Official counts indicate that in 1916 there were between 800 and 2,000 birds on the island, and that year a forest fire swept over the wooded area and cut the flock down so severely that in 1917 only 150 birds were seen. Three years later the number increased to about 600, according to the superintendent, Allan Keniston; but in 1921 it fell to 314 and in 1922 to 117. In 1923 only 28 were seen in the spring and they were all males, but two females were discovered late in the season and in April, 1924, the observers counted 54 birds. This count was made by Dr. Alfred O. Gross, of Bowdoin College, who is regarded as the greatest authority on the heath hen, and it gave a note of encouragement. Last April, however, Dr. Gross could find only three birds.

BLACK-TAILED JACK RABBITS

They are distinguished from the Antelope Jacks but are common in Arizona.

Hunting Antelope Jacks

By ARTHUR NEWTON PACK

ANYONE who crosses the desert of southern Arizona can see a Jack Rabbit, but when it comes to photographing one, well, try it and learn about inconsistency from Jack. For the past two years the valley which leads from Tucson down into Mexico has almost forgotten what a real rain is, but the Jacks don't seem to mind that. "Why worry when there are lots of nice juicy Prickly Pear cactus to eat." That's what they say, and even if you don't like your dinner served up with long sharp porcupiney spines sticking out all over it, the Jack Rabbit family is not so particular. The chances are when you take one bite the rest of the dinner will stick to your face or your back and accompany you to the shade of a nearby mesquite where you can at leisure, and with only a moderate amount of pain, separate the salad from your forepaw and the dessert from between your tremendous ears.

The best way to hunt Jacks is with plenty of atmosphere, and atmosphere is something of which Arizona makes a specialty, from the wine-laden winds that pour down over the mountains to the numberless kinds of cactus and strange thorny shrubs, from the glow of endless perfect sunsets to the rich plum-colored velvet shirt and wide-brimmed hat of our driver guide. Our car dipped downward to the sandy bed of a dry stream. Two long pink-lined ears rose from behind a pile of brush. Almost before we could speak those ears seemed to bend forward a little and then shoot into the air above a gray body. Even in that instant we could see a pair of abnormally long slender hind legs and Jack settled down to the business of running. "Look, look!" came a shout as two, three, a dozen other similar animals accepted the warning and bounded off. There must have been an army of

Jack Rabbits all about us, for the drove gained in numbers as it ran. White patches flared out clearly now on flanks and rear, seeming to flicker from side to side —white patches of raised fur which give these largest members of the Jack Rabbit tribe the name of Antelope Jacks, and distinguish them from the black-tailed Jack also common in Arizona. Like great puffs of cotton before a hurricane they sped until it seemed as if the whole herd had blown away.

"You'll have a nice job catching them to photograph," offered Ed —he of the plum shirt. It didn't look promising, but the camera man decided to set up his machine in a little dry canyon and let the rest of the party circle out among the cactus and mesquite on a rabbit round-up. Minutes passed without a sound or movement save for the linnets which flickered in and out among the brush. A Road Runner strode out from behind a mesquite and almost instantly disappeared. Then a big Jack scurried across the road on the far side of the depression—out of range. Another and another followed, and as each reached the low ridge he gave one tremendous bound straight into the air, apparently to observe the direction of a hidden enemy. The men down the canyon must have started fifty or a hundred, for on they came. Suddenly something brushed against the very camera tripod and like a streak of gray and white four frightened Jacks bounded past. A thin and bony range cow galloped in their wake, saw the photographer and brought up with a snort. That was all—silence again descended upon the canyon until voices proclaimed the return of the beaters. It was clear that this was no way to make a good picture.

TIME OUT TO SCRATCH

But at the slightest sign of alarm he will be off.

MOSTLY EARS

Long and pink-lined, they are alert hearing apparatus.

In observing wild life there is always one sure rule to follow. Keep still and use patience. A mile or more beyond we again sighted a pair of erect pink-lined ears. We simply stopped and waited for the owner to make up his mind as to our harmless intentions. Then began a slow and careful stalk. With the camera thirty feet away Jack began to get nervous and hopped off a few yards, but there his eyes rested upon a luscious cactus. He simply could not resist. A cholla thorn caught on his back, and as he vainly kicked at it with his hind foot the camera man stepped closer. Whenever Jack looked up the photographer stood stock still. Whenever Jack resumed the business of taking cactus nourishment, the camera reeled off a few feet of film, and crept nearer and nearer. Jack was now only twelve or fifteen feet away. Perhaps if the sun had not gone down—but then, complete success seldom comes the first time, particularly with Jack Rabbits.

Ed had a story about Jack Rabbits. He told it to us that night as our campfire of dead mesquite branches threw flickering shadows beneath the twisted old live-oak near the canyon mouth. He

said that a track man, a runner, from Yale had came out to work on his uncle's ranch. They put him to work herding sheep into a corral. The third day the rancher came out to see how things were going. "Having any trouble," he inquired. "Well, some," replied the tenderfoot; "some of the lambs are kind of hard to herd and I've had to keep pretty lively rounding them up." "That's funny," said the rancher, "I'll have a look at them." He found the corral was half full of big Antelope Jack Rabbits.

NOT UNLIKE AN ANTELOPE,—AT THAT

The long, slender hind legs are efficient running equipment.

RESTING BUT ALERT

Young rabbit hugging the desert floor.

The sun rose late over our canyon camp beneath the shadow of the Santa Rita Mountains. We saw below us the desert stretching for endless miles in patches of sunlight and shadow from swift driven clouds, a desert stretching far and wide to a distant boundary of blue-jagged mountains. The grotesque chollas, the spreading mesquites, the dried clumps of goldenrod beckoned to more Jack Rabbit adventures. Yes, as the car rolled down to the edge of that plain, Jack was again sitting by the side of the road. No raiding coyote had disturbed his equanimity, indeed, beside him sat a lady friend—his wife, perhaps. Now last night Jack had seemed a philosopher, an epicurean, enjoying to the full his feast of prickly pear in spite of human beings who pointed at him a strange clicking device on three long legs. He had found out that those legs, although far longer than his, had no running ability which could match his. But timid woman disturbed him. She frankly had no desire to be photographed and womanlike perhaps, a lesser appreciation of breakfast delights. Where Jill led, Jack must follow. We looked out upon a rabbitless vista.

"What we need is another bachelor," said Ed, who had now decided that, if the tenderfeet in his care wanted to stalk Jack Rabbits, he was going to have all the fun out of it he could. "Let's drive over here a couple of miles and try again." It seems a curious thing that of fifty Jack Rabbits, forty-nine will run away but one will usually be tame. Sure enough, bachelor or no bachelor, we again found a fiftieth, and for one solid hour he allowed himself to be photographed again and again. He loked at the cameraman from time to time and as often went about his business of getting stuck up with cactus and eating himself free. No naturalist could ask for a better opportunity. Then—no one knows why—as suddenly as though an unexpected bomb had exploded, he took one more look and bounded away like a puff of cotton before the wind. Inconsistency, verily, verily, thy name is Antelope Jack.

This story of the Antelope Jacks is only the first of several that will appear as a result of the American Nature Association's Expedition into the Southwest.

"Island Universes"

By ISABEL M. LEWIS

IT MAY seem strange to speak of universes when one is accustomed to think of the universe as all-embracing, "the whole system of created things," as our dictionary tells us. Yet the astronomer of modern times has felt the need of a word to describe far-distant systems of stars, intermingled with nebulas, forming each an organized whole complete in itself and entirely independent of our own particular system of stars which we speak of as the Milky Way system or the galactic system.

For many years it has been a question as to whether countless faint patches of light in the heavens, many of them called spiral nebulas because of their nebulous appearance and spiral form, were far-away systems of stars independent of our own star system and nebulous in appearance because they were too distant for the telescope to reveal the individual stars, or whether they were comparatively near nebulas, true members of our own Milky Way system with its hundreds of millions of stars.

It was but a few months ago that the discovery was definitely made by Dr. E. P. Hubble, who was studying spiral nebulas with the great 100-inch telescope at the Mt. Wilson Observatory, California. He found that the greatest of the spirals, the Great Nebula in Andromeda, was indeed an enormous sys-

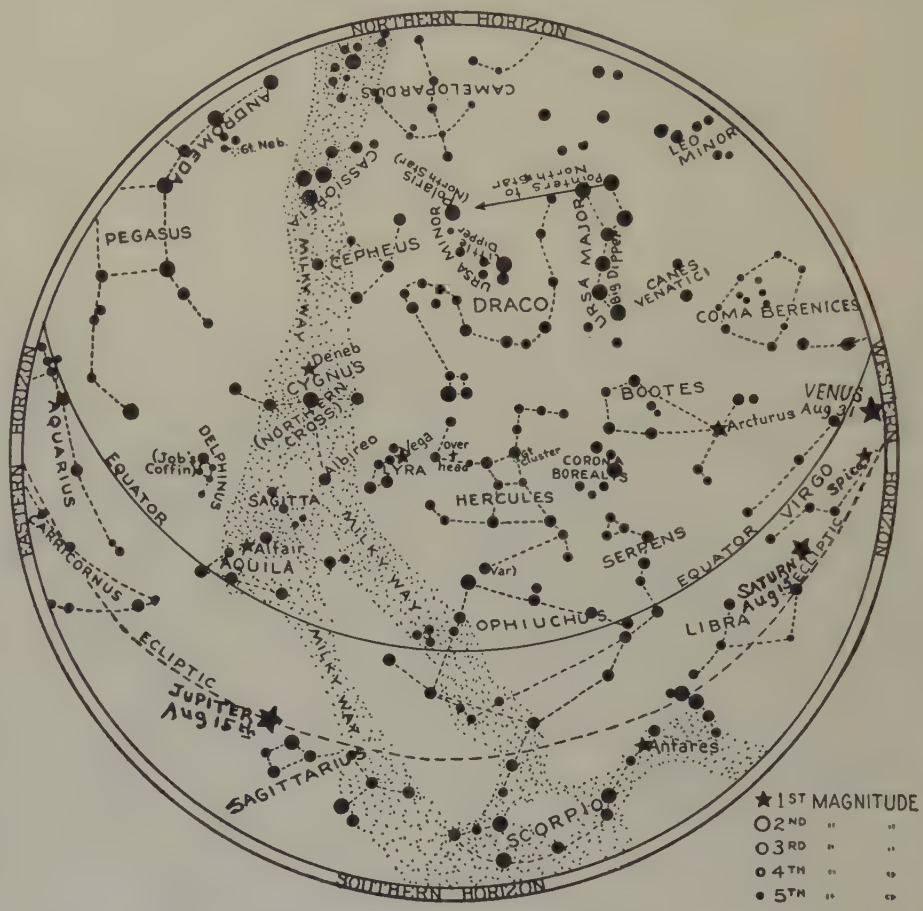
THE GREAT SPIRAL NEBULA OF ANDROMEDA

tem of stars, a true "island universe" at the inconceivably great distance of a million light years. Think for a moment what that means! A universe of countless suns a million times six trillion miles away! A universe so distant that its light must have started on its journey toward our little speck of a world hundreds of thousands of years before the human race appeared upon this planet!

There are beyond doubt many thousand, possibly hundreds of thousands—we hesitate to say how many—of these island universes similar in form to the Great Andromeda Nebula and as distant or even more distant from us. It has always been considered that the Great Andromeda Nebula was one of the *nearest* of the spirals because of its exceptional size. The spiral nebulas alone are numbered by hundreds of thousands and there are in addition many faint nebulous patches that show no spiral form. It is only possible to determine the distance of these so-called nebulas when they can be resolved into individual stars among which appear Cepheid variables, a certain type of star found in the Magellanic Clouds and in the Milky Way that from certain peculiarities give the clue to the distance of the object in which they are found.

The Magellanic Clouds of the southern hemisphere now also recognized as "island universes" are comparatively near to our Milky Way system, their distance being of the order of one hundred thousand light years. In appearance they look very much like detached fragments of our own Milky Way with their numberless faint stars—each a sun—their luminous nebulous patches and their dark streaks and holes, dark nebulas projected against a luminous background of stars. Our own Milky Way abounds in such regions, in Cygnus, Sagittarius, Scorpio and elsewhere.

For a moment let us consider the nature of our own "island universe," the Milky Way, as we familiarly call it, in which our own sun with his family is a very humble unit. One may see a portion of the belt or girdle of the heavens that we refer to as the Galaxy or Milky Way stretching magnificently across the heavens these beautiful midsummer evenings, a different portion, of course, from that which we see in midwinter skies. From Cygnus to Scorpio, you will note from your map, the Milky Way separates into two distinct branches. The dark region between is no longer believed, as formerly, to be a gap in space devoid of stars. Instead it is a nonluminous portion of the Milky Way itself consisting of dark matter made visible by contrast with its bright background, and drawing its veil of darkness over we know not what distant and presumably star-filled regions.



Hold over the head with top toward North.

By far the greater majority of stars in our own stellar system, it has long been known, crowd toward the central plane of the Milky Way which we may look upon as the backbone of our own system of stars. As its extent in the plane of the Milky Way is far greater than its extent at right angles to it we have as a result a lens-shaped or watch-shaped universe, very similar in appearance to some of the spiral nebulas viewed edgewise.

Dr. Harlow Shapley, Director of the Harvard College Observatory, who has given much study to the nature and shape of the Milky Way system of stars, the galactic system, as it is generally called, has estimated that the extent of the Milky Way in its fundamental plane is approximately 350,000 light

years, while in a direction at right angles to this the extent of the system is only of the order of 10,000 light years. The solar system, our sun and his planets, he estimates, lies close to the fundamental plane of the Milky Way and about 60,000 years from its center which lies among the star clouds of Sagittarius, a region of the Milky Way now visible low in our southern skies.

Though some astronomers do not agree entirely with Dr. Shapley as to the size of the Milky Way there is no doubt that its extent is enormous and to be reckoned at least in thousands if not tens of thousands of light years. Dr. Heber Curtis, of the Allegheny Observatory, gives a much more conservative estimate of 30,000 light years for the extent of the Milky Way system of stars. All agree, however, as to the *shape* of the system, which is universally described as greatly flattened in the direction of the Milky Way, all the stars of the system tending to crown toward the central plane of the Milky Way.

To this wonderful Milky Way system of stars our own sun and his family belong, and in the two thousand billion years or more of past existence must have journeyed far and wide within its bounds and passed through many strange and to us unexplored regions of the Milky Way, new constellations gradually taking form and later fading away during the ages when no human eye existed on earth to admire them.

In addition to the Milky Way, which is particularly beautiful in the eastern evening sky this month, we wish to call the star-gazer's attention to the Northern Cross in Cygnus which now lies high in the eastern sky in the Milky Way. Near by is the small constellation of Sagitta. The Arrow, also in the Milky Way, south of Cygnus and north of Aquila, The Eagle, which contains the first magnitude star Altair, easily recognized by the two faint stars in line with it, one on either side of Altair and not far from it. Altair is a near neighbor of the solar system, being only about sixteen light years away.

Scorpio, with its fiery Antares, and Sagittarius with its little inverted milk dipper, are now visible in the southern heavens. Both of these groups lie in the path of the Milky Way and contain a number of bright stars that make it an easy matter to trace their outlines with the aid of the map.

Hercules is now in the zenith in our latitudes and is flanked on the east by the constellation of Lyra, The Harp, with its magnificent Vega and on the west by the beautiful little Northern Crown, both small groups that are easily recognized. Boötes with its brilliant orange-colored Arcturus is now half way to the horizon in the western sky and the Big Dipper has swung far over to the northwest as Cassiopeia appears in the northeast.

Three planets are visible in the evening this month; Venus in the west after sunset, setting about two hours after the sun by the end of the month, Saturn now in the southwest between Virgo and Libra, and Jupiter in Sagittarius, in fine position for observation during the greater part of the night. A small telescope will show the Belts and the four historic satellites of Jupiter which were discovered by Galileo. If the seeing is good even a field glass will reveal the tiny points of light which are the four moons in question. Only the most powerful telescopes will show the other five of Jupiter's family of nine moons.

August is a fine month to look for meteors, for the Perseids, one of the best known and most widely distributed in their orbit of any of the periodic swarms, may be seen on almost any clear dark evening during the first two weeks in August. They will appear as yellowish streaks of light darting across the heavens and seeming to radiate from the direction of the constellation of Perseus, whence their name of Perseids. They will appear in greatest numbers and will be seen to the best advantage around the midnight hours when Perseus is high in the heavens. Periodic swarms of meteors such as the Perseids that return every year can usually be identified with some past comet that has become disintegrated and scattered along its orbit. When these particles moving around the sun in their orbit encounter the earth in its orbit at a certain time of year many of them are swept up by the earth's atmosphere, flash into incandescence as a result of the friction produced by their passage through the air and are rapidly consumed.

No adequate compilation has ever been made of information on organizations of nature lovers, nature study activity, facilities of museums, nature work of a wide variety of groups and many allied interests. Such a compilation the American Nature Association proposes to make and to publish in an attractive and complete volume. All organizations and institutions that have nature and outdoor interests are earnestly asked to cooperate by providing information on their work, scope and personnel. Please write to The American Nature Association, 1214 16th St., Washington, D. C.

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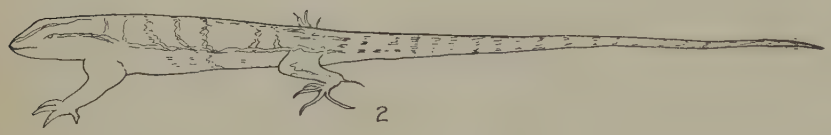
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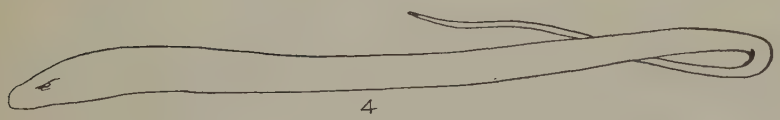
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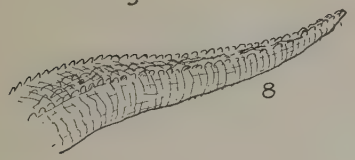
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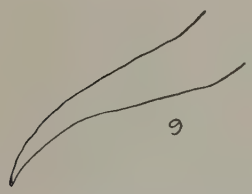
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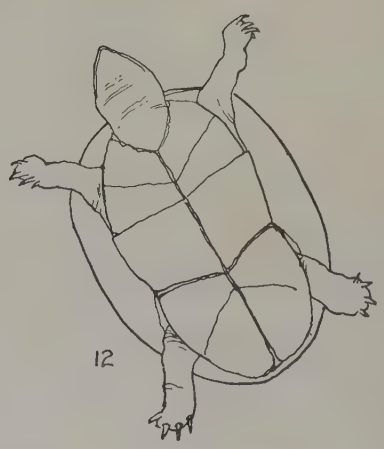
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Practical Nature Puzzles

By E. LAURENCE PALMER

SOME of the creatures shown on these pages were probably thought of as lizards. This month some of the creatures shown really are lizards. Lizards, snakes, turtles and the like all belong to a group of animals known as reptilia and as is the case with most groups of animals serve a variety of functions. It is absurd to claim, for example, that all snakes are good or all snakes are bad. Different species have different habits and different individuals of a given species vary. Some of the differences in habits of reptiles are indicated by structural variations. Numbers one to four show sketches of a few lizards with different habits.

1. Which of the pictures represents a horned toad which easily burrows into soft earth or lies flat and inconspicuous on the surface? ( )
2. Which represents a lizard which climbs trees and fences with great ease? ( )
3. Which represents a glass snake that burrows under loose material with ease? ( )
4. Which represents a Gila monster that neither climbs nor burrows as easily as the others but relies upon protection by coloration and possibly by its poisonous bite? The gila monster is the only one of these creatures that is harmful. ( )

The forefeet of lizards may sometimes be found about the feeding place of many of their enemies. If you should find any similar to those shown in numbers 5–7,

5. Which would belong to the burrowing horned toad? ( )
6. Which would belong to the climbing fence lizard? ( )
7. Which would belong to the nonclimbing Gila monster? ( )

Tails of reptiles are of some significance occasionally as shown in numbers 8–9.

8. Which tail belongs to a land turtle? ( )
9. Which tail belongs to the alligator that lives in water? ( )

Turtles' dispositions are frequently indicated by the protection their under surfaces receive by means of their shells. A pampered child is less aggressive than a ragamuffin that is forever "on his own."

10. Which of the pictures shows a snapping turtle which has a most aggressive disposition? ( )
11. Which shows a box turtle which is most gentle and docile? ( )
12. Which shows a painted turtle which is more active than the box turtle and less active than the snapping turtle? ( )

The feet of turtles may be worth noticing as shown in numbers 13–15.

13. Which of the feet belongs to a sea-turtle that is not found on land except when laying its eggs? ( )
14. Which of the feet belongs to a tortoise which lives on a desert? ( )
15. Which of the feet belongs to a mud turtle that is in a way intermediate between the other two? ( )

The position of the eye in reptiles may occasionally be important in understanding the habits of the creatures.

16. Which of the eyes shown in numbers 16–18 belongs to the burrowing glass snake? ( )

17. Which of the eyes belongs to the alligator which lies submerged in water but may watch for its prey above water? ( )

18. Which of the eyes belongs to a tortoise which lives on dry land? ( )

The position of nostrils may be slight significance as shown in figures 19–20.

19. Which nostril belongs to an alligator that lies under water but breathes at the surface? ( )

20. Which belongs to the land tortoise? ( )

Rattlesnakes, of course, are poisonous. They courteously warn us of their intention to attack and their rattles are worthy of study. The number of rattles does not indicate the number of years the snake has lived; nor does it always indicate the number of times the snake has changed its skin. A new section of the rattle is added each time the skin is changed but some of the earlier sections may be lost while being used. A complete set terminates in a well-formed button. Indicate as nearly as possible the number of times the skin was shed by snakes bearing rattles such as are shown in numbers 21–26.

A majority of the snakes found in the United States are strictly nonpoisonous. Some are poisonous to small animals and some are poisonous to man and other animals. The poison of poisonous snakes is injected with the aid of special teeth. Naturally teeth in the front part of the mouth can be sunk deeper into the prey than can teeth in the back of the mouth. Numbers 27–30 show the heads of four snakes.

27. Which represents the head of the deadly poisonous rattlesnake? ( )

28. Which represents the head of the harmless black snake? ( )

29. Which represents the coral snake which is less dangerous than the rattlesnake? ( )

30. Which snake is less dangerous than the rattlesnake and more so than the coral snake? ( )

Snakes move by means of plates on the under side of their bodies. These are frequently significant showing the type of territory over which the snake moves. Two of these plates are shown in numbers 31–32.

31. Which of these plates belongs to a tree climbing snake? ( )

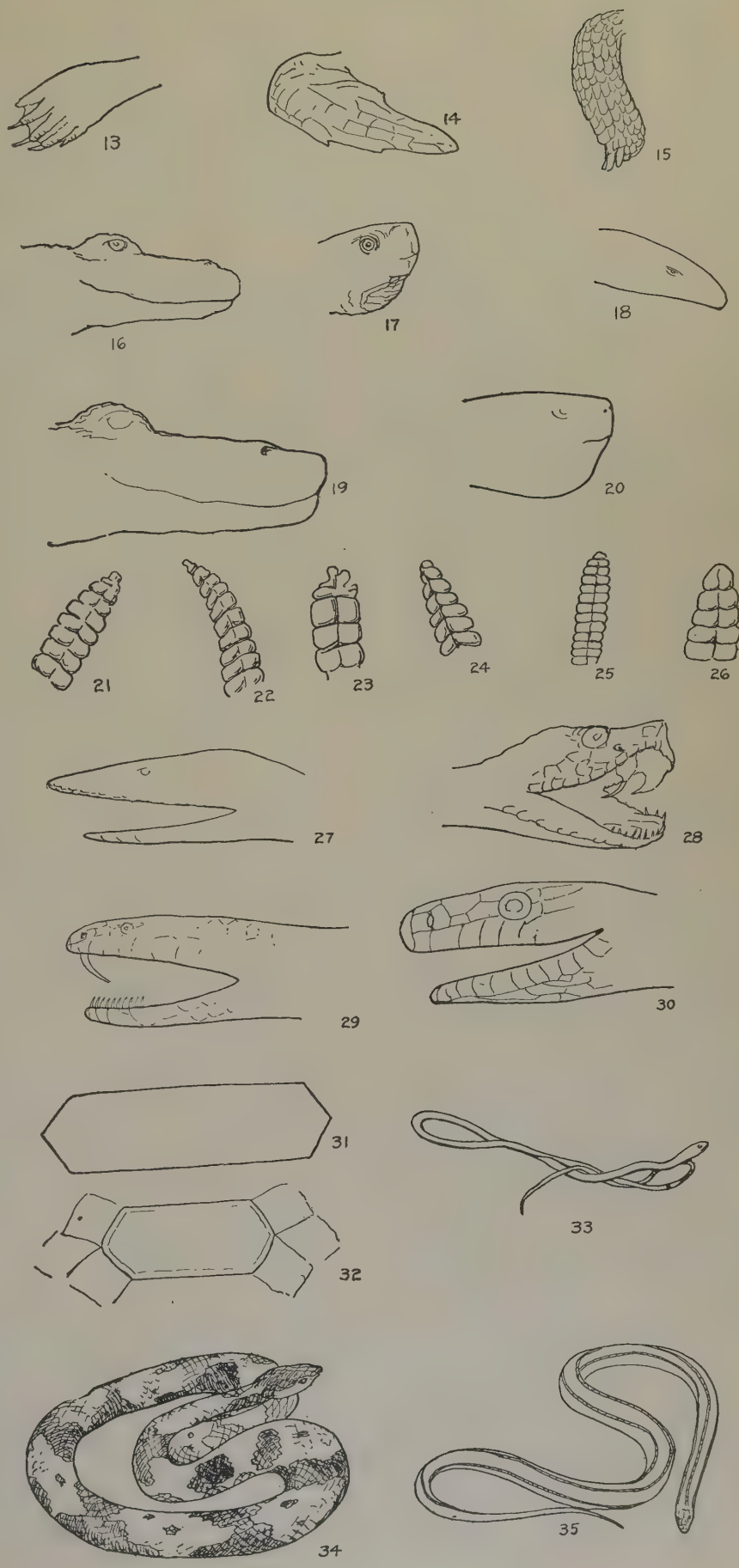
32. Which of these plates belongs to a snake that moves over the ground? ( )

The coloration of snakes is often interesting as shown in numbers 33–34.

33. Which of these figures represents the copperhead that is found on the leaf-covered floor of a forest? ( )

34. Which represents the differently colored garter snake that lives among the grasses? ( )

35. Which represents the green snake that lives among the grasses but is inconspicuous because of its greenness? ( )



Nature Study Review

The Candle-nut Tree

By Anna Botsford Comstock

THE MOUNTAINS around Honolulu are very picturesque; they are of volcanic origin, their steep slopes have been worn by torrents into deep defiles alternating with sharp ridges, and they notch the skyline with irregular peaks. The beauty of the mountains lies largely in their covering of trees and shrubs of varying color. Wrought into this vivid green mosaic are patches of pale whitish green which add much to its effectiveness and which consist of the foliage of the Kukui trees, *Aleurites moluccana.*

The leaves of the Kukui are variable in shape, being broad and often lobed at the base and long pointed at the tip; they are light green in color but their pale hue is due to the fact that the foliage and terminal shoots are covered with a silver gray powder. The tree flourishes from a little above sea level to 2,200 feet up the mountain slopes. It reaches its true grandeur as a tree in the narrow gorges where it often attains the height of eighty feet, the trunk several feet in diameter rising for thirty or forty feet before the great undulating branches come off. As if to show its adaptability, sometimes when the occasion requires, the trunks and branches stretch prone upon the mountain side, twisting this way and that, a veritable tree dragon.

The wood of the Kukui is light in color, soft and not durable, for it decays quickly. However, the use of the tree is by no means confined to the lumber it produces; and the uses made of the Kukui by the native Hawaiians were manifold.

The flowers are creamy white and are borne in a corymb, the staminate flower is about one-third inch across; the five rather blunt cream white petals are set within a roughened calyx cup that divides stingily into two lobes to allow the petals to spread; the anthers are set on short fleshy filaments and are many—fifteen or eighteen—and are minute. The pistillate flowers are borne on the same branchlet as the staminate but are few in number. They have no petals and are just little globes with a pair of divided, curved pink stigmas protruding from each. The branchlets of the corymb are white and powdered so the flower clusters look like white tassels on the tree.

The fruit, which is about the size of a black walnut, contains one or two plump kernels which are swathed in four coats and consist of 50 per cent of oil; these nuts made the Kukui a tree valued highly by the ancient Hawaiians. They strung the kernels on splinters of bamboo, thus making torches or candles. They also pressed the nuts and used the oil in stone lamps. They used the oil upon their bodies for several reasons; one was to render the body slippery when playing their games. The untrained olfactories of the early missionaries suffered discomfort when the Hawaiians came to meetings well oiled. The oil was used on tapa cloth to make it waterproof. There was a time when 10,000 gallons of this oil was exported yearly to Europe, where it was used in mixing paints. The cake, after the oil is pressed out, is used for cattle food and also for fertilizer. The leaves of the tree were also used to fertilize taro fields.

The shell of the nut is hard and dark and is shining black when polished. It was used for ornaments and for leis (necklaces). The fleshy, acrid covering around the kernel furnished the black dye which was used in ornamenting tapa cloth and also for tattooing the skin. The soot from the burning nuts was used for painting canoes. The oil was also used as a purgative medicine; and the juices from the leaf stems and the leaves were used to cure wounds and bruises. A gum exudes from the bark which is used for several purposes. The nuts when roasted are chopped and eaten with salt as a relish, as we use salted almonds.

The Kukui is common on other tropical islands of the Pacific and in India, where it is put to uses similar to those described, it is an interesting question as to the origin of the trees of these islands. Perhaps the ancient Polynesians brought them along when they voyaged to Hawaii in their canoes, for these voyagers of the South Pacific were even more daring than the Vikings of North Europe. Be that as it may, the Kukui is reckoned as one of the Hawaiian forest trees and far and near embroiders the mountain sides of this beautiful Pacific island with its whitish-green foliage.

Answers to July Nature Puzzles

The answers to the July puzzles are as follows: tree toad, 2; spade foot toad, 3; bullfrog, 1; meadow frog, 4; adult salamander, 6; larval salamander, 5; pickerel frog, 8; tree toad, 7; bullfrog eggs, 10; pickerel frog, 9; immature newt, 12; mature newt, 13; mud puppy, 11; bullfrog tadpole, 15; meadow frog tadpole, 14; meadow frog, 18; common toad, 16; bullfrog 17; tree toad, 19.

Hints to Nature Readers

By ELIZABETH K. PEEPLES
Instructor of Natural History, Washington, D. C.

This discussion of articles in the Magazine, together with hints to teachers and other readers on how to use them, is proving most helpful in Educational Work

Hunting Antelope Jacks For those denied the delights of travel there are compensations such as this article. If you have a wish for the atmosphere "of which Arizona makes a specialty, from the wine-laden winds that pour down over the mountains to the numberless kinds of cactus and strange thorny shrubs, from the glow of endless perfect sunsets to the rich plumcolored velvet shirt and wide brimmed hat of the driver guide," and for Jack Rabbits, join the party whose adventures in photographing the latter amid the former are so enticingly set forth in "Hunting Antelope Jacks."

* * *

Rubber—Nature's Tropical Gift Here in a nutshell is an account, which might easily be expanded to volumes, of rubber, "soft, resilient, and cushioning—somewhat typical of civilization." The story of rubber production and the rubber industry is a romance. The location of different varieties of rubber trees, and an explanation of the origin and nature of the milky juice from which caoutchouc is made, how it is obtained, and how prepared for market, take one into the heart of the tropics.

* * *

Dogs of the Arctic Frontier The Eskimo dog, husky, malemute, or siwash, as he is variously called, has figured largely in all exploits of the far North. Alaska could not have been explored without the dog. Though his origin is still a mystery, it seems reasonable to suppose, considering all the evidence, that both he and the Eskimo came from the Old World. Differences of opinion obtain as to the proper classification of these Eskimo dogs, and the relative values of different kinds. Actually there are two classes, good dogs and bad. He loves equally to fight and to work. Winter is the time when he is at his best, but not the only season of his usefulness.

Thunder Makers of the Tule Marsh The poet who wrote, "A very fine bird is the pelican," should have mentioned that it is a fine subject for a bird lesson for children of almost any age. Its grotesque appearance instantly arrests the attention. The sac under the bill, used as a dipnet in fishing awakens curiosity. Added to this, there are many interesting habits for study. Pelicans make a noise like thunder in alighting. The young feed upon the fishy soup which has been digested by the parent bird and regurgitated into his or her pouch. A lively description is given of this amusing process. The illustrations, showing pelicans at different ages, and variously occupied are invaluable teaching material.

* * *

Horse Sense This story of an incident in the summer vacation of a forestry professor gives forest facts a fictional setting, which might easily be duplicated in almost any town in the U. S. A. Besides quoting the startling statistics, which better than anything else drive home the story of America's dwindling forests, and describing a forest fire, the story makes clear the misunderstanding and indifference of the average citizen toward this most vital subject, and the irrefutable logic, "horse sense" with which it must be overcome if national disaster is to be averted.

* * *

The Circus Elephant Boys from eight to eighty, and girls as well for that matter, who have never known a thrill at sight of the circus parade, are warned against reading these personal recollections of Jumbo and other circus elephants. All others will find them truly delightful. The circus is a child's best introduction to the animal life of foreign lands. Professor Sharp's reminiscences afford intimate and fascinating insight into oft neglected phases of elephant nature, intelligence, gentleness, and a sense of humor.

Meet the Puffballs Lessons in seed distribution may be supplemented with a study of the ingenious ways which Nature has provided for scattering the spores of the puffballs. These fungi are readily found, and in addition to, or as a means of identifying the ones which the class may collect, there will be found with the article excellent pictures and detailed descriptions of nine varieties. Investigation of the structure of these curious fruit bodies, and comparison with the ordinary mushrooms is profitable. In spite of their food value children should not be encouraged to sample the delicacy except under the watchful eye of one who knows absolutely "when a puffball is not a puffball."

* * *

Hummingbirds—The Story of Ruby-throat The family life of birds is an intriguing theme. This story of a hummingbird's spring migration, nesting, and family cares has enthralling interest. Life in the nest is perhaps of all phases of bird life the most entertaining, and an account, such as this, based upon keen and patient observation and illumined by sympathetic insight, arouses in all who read the desire for similar first-hand knowledge. In watching nesting birds, however, one cannot overstress the importance of dark-colored clothing, quiet movements, *respectful distance,* in short, the courteous consideration one would have a right to expect when engaged in the same momentous project.

* * *

Shells, the Flowers of the Sea The shells of Sanibel Island off the west coast of Florida are herein classified, named, and so well described that identifying them would be comparatively simple even without the aid of the excellent illustrations. Besides sizes, colors, and shapes there are occasional descriptions of the animals living within, as, for example, the account of how the Crown Melongena, "a devilish-looking whelk," preys upon the Left-handed Whelk.

Well Done, Son!

Smoke was curling up and flames licking along the forest floor. Trevor Kavanaugh, eleven years old, but a good conservationist, saddled his horse at the T. and S. Ranch near Dryden, Wash., and rode through the night to the nearest telephone, a mile and one-half away, to report the blaze to the forest ranger. All next day he carried water and lunches to those who fought and subdued the fire, saving a valuable growth of yellow pine. Ranger Chartrand reported the incident and Secretary of Agriculture Jardine wrote his personal thanks to the young man and in behalf of the people. A fine lesson to the careless camper and tobacco smoker!

New Hampshire Meeting

The region of Mount Chocorua has been selected for the annual meeting of the Society for the Protection of New Hampshire Forests to be held at Camp Allegro on Silver Lake, Madison, N. H., September 2, 3, and 4. Among the subjects up for consideration will be the question of cooperation under the McNary-Clarke Forestry Act, particularly with relation to state programs as worked out by the National Forestry Program Committee. Several more local considerations concerning the work of the society will be taken up. An excellent list of speakers has been prepared and the meeting will be marked by several recreational activities.

Garden Guild Grows

Increase in membership and number of branches of the National Plant, Flower and Fruit Guild were reported at the recent annual meeting of the organization in New York. Encouragement of church garden clubs and birthday gardens were reported as among the newer activities of the Guild. Another piece of work undertaken is that of establishing children's gardens in the Bronx.

Spain Awakens

Home of the bullfight, Spain has been infertile ground for producing anything in the way of wild life conservation and humanity toward the animal world. A new attempt has been made to combat this situation with the organization in Madrid of the Society for the Protection of Animals and Plants. The society enjoys royal patronage and support, has a membership of people prominent in literature, teaching and the professions, and is a federation of several other smaller organizations that started out to awaken Spain to an appreciation of animal life and conservation. The new society will take the sound task of carrying on its campaign among the school children.

To Study Highways

Survey of highways in the United States from the point of view of their recreational value in providing the people ingress to the outdoors has been undertaken by the Chamber of Commerce of the United States. Arthur Comey of Cambridge, Massachusetts, has been assigned to the work, which is under the Civic Development Department of the Chamber. Any suggestions as to the scope or details of this "pathfinder" survey are solicited by the Chamber.

Watch the Pines

Keep a close watch on your pine timber, the United States Department of Agriculture counsels timberland owners of the South, particularly if there is continued dry weather. Recent studies of the southern pine beetle show that periods of abnormally low rainfall encourage the beetle. It is urged that a watch be kept for dying pines and that reports of the presence of the beetle be sent to R. A. St. George, Bureau of Entomology Field Station, P. O. Box, 1518, Asheville, North Carolina.

A Zoo for Insects

In the Palisades Interstate Park in New York there has been established a new kind of zoo—an insect zoo. It opened on July 1 and has, besides its zoological character, the distinction of being an entomological field station for the American Museum of Natural History. Plants, trees and shrubs grow in the zoo, a brook winds through it and a garden will be established for plant and vegetable insects to enjoy. Good and bad insects are in the zoo, from parasites to aphis-eaters. Nature guides will be available for the visitors to the new kind of zoo.

Croaking Dog-Fish

Writing to the *Amateur Aquarist*, organ of the British Aquarists' Association, a correspondent says: "During the winter, one of my dog-fish has been persistently croaking at the surface of the water. At first, owing to the difficulty of locating the sound, I thought that it came from a toad in some hole in the outer wall but, upon investigation, I caught the fish in the act." He wonders whether this is a common occurrence, and the editor, Mr. A. E. Hodge, says that he had a dog-fish that croaked with "a harsh but subdued grating noise like the muffled croak of a toad." He adds that, after the fish had been installed in a more commodious tank this ceased, the assumption being that the noise was called by difficulty of respiration.

State Recreation

Appointment of a State Recreation Commission by the Governor of Oregon is a reflection of the rapid spread of the recreation and out-of-door movement. Oregon is rich in recreational facilities not only for the people of the State but for the people of the other States as well. The creation of such a commission should prove of value in bringing more to enjoy the great possibilities that exist.

Studies by Erwin W. Jenkins and Herschell Fox.

What Leaves Are These?

Try to identify them and see NATURE MAGAZINE for September for the answer.

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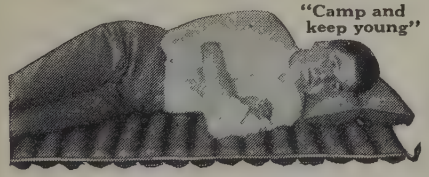

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Swallows and Martins

Interesting observations of cliff swallows and martins were made by Arthur P. Wyand, of Washington, D. C., at Keedysville, Maryland. He found the swallows living in limestone cliffs with their nests well within the limestone which was fairly honeycombed with little pits and caverns. The swallows return each year to these high and dry nesting places and set about building their nests like flattened cups, divided perpendicularly. These are made of clay, mud and straw, lined with horse hair or feathers. Mr. Wyand also observed a large number of martins in the locality and the fact that the wiser home owners are encouraging these birds, which eat many mosquitos and other noxious insects by the erection of martin houses for them.

The Cost of Impatience

Impatience to make foreign plants quickly available by importing them in quantities into the United States has resulted in the introduction of plant diseases and pests responsible for an annual loss that will soon, accumulating, equal our war debt, declares the United States Department of Agriculture. Several costly instances are cited, including the Chestnut blight brought by an imported Japanese chestnut; Oriental fruit worm, carried by imported Japenese flowering cherries and the enemy of many stone fruits: citrus canker, brought in on plants of the trifoliate orange; date scale, imported from Africa on date plant shoots. The Department points out that the ban on bulbs is to prevent the bringing in of new and expensive crop enemies known to infest these bulbs and including the Japanese beetle, European wireworms, eelworms, bulb flies and many other pests. Patience until the bulbs can be propagated safely and cleanly in the United States is urged.

Cornell Leaflet

Cultivated food plants form the subject of a new Cornell Rural School Leaflet prepared and supervised by E. Laurence Palmer of the New York State College of Agriculture, Professor of Rural Education. It is issued for boys and girls, but it will be read and studied with equal interest and appreciation by their parents. The pamphlet deals with the reasons for the selection of the food plants, their cultivation and closes with an admirable and remarkable life history chart of these plants.

Madonna Lillies

To Glorify Your June Garden!

These stately flowers, symbol of purity and devotion, whose regal grace and glistening whiteness gives a supreme distinction to any garden, are especially alluring against a background of blue Delphiniums.

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Aniakchak Crater, on Alaska Peninsula, is one of the most remarkable natural objects on this continent. It is an enormous basin, whose floor measures six and three-quarters by five and three-quarters miles, an area more than half as large as the District of Columbia. The rock walls that form the rim of the crater rise in places 3,000 feet above its floor, and a cinder cone in the crater rises to a height of 2,200 feet, four times that of the Washington Monument. In a hollow in the crater's floor lies a lake that is two and one-half miles long and that has an area of two square miles.

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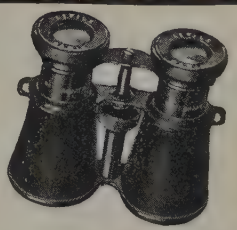

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Spotting the Fire

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No Sequoias in Yosemite Park

Visitors to Yosemite who are interested in the trees often ask the Nature Guides about the difference between the Big Tree (*Sequoia gigantea*) and the Incense Cedar (*Libocedrus decurrens*). While the largest specimens of the Big Tree would not be mistaken for the Incense Cedar, the Incense Cedar is often mistaken for the Big Tree on account of the similarity in the bark. There is a very marked difference, however, in the branchlets of these two trees. Both have scale-like leaves, but on the Incense Cedar these are on flattened branchlets, while on the Big Tree the branchlets are cylindrical. Another marked difference in these two trees is in the cones. Those of the Incense Cedar, composed of only three scales, are urn-shaped, and about three-fourths of an inch long, while those of the Big Tree have many scales and are from one to three inches in length. There are no Big Trees in Yosemite Valley except the few which have been planted here.

Robin and Chick

"An unusual thing was noted on Berlin Street, Montpelier, yesterday when a robin was seen feeding a baby chick that had been deserted by the hen that hatched it," says the Barre (Vt.) *Daily Times*. "The hen had killed all but one of the hatch and this one chick had been taken away from the hen and placed in a coop all by itself. The robin was seen to fly down out of a tree and try and put a worm into the bill of the chick. Failing to do this, the robin dropped the worm down in front of the chick. That worked better and the chick at once grabbed the worm. Now every time the chick peeps the robin brings a feed for it and seems to take great pride in her adopted chick."

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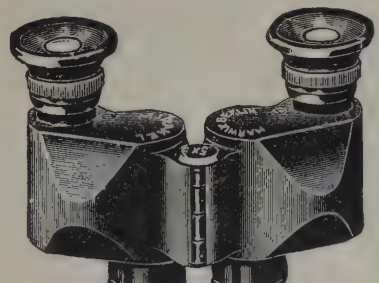

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American Nature Association **Washington, D. C.**

Questions and Answers

The American Nature Association will be glad to answer each month such questions as its members ask about Nature.

QUESTION: *Are the Copperhead and the Timber Rattlesnake found as far north as Waterville, Maine?—B. F.*

ANSWER: The Timber Rattlesnake is found locally as far north as Maine but is not common. The Copperhead is not known to occur north of Massachusetts and is very rare and local even there.

QUESTION: *If a crow eats on the carcass of a rabid dog will it contract rabies; also will a skunk be liable to get it? If so, how would they act and what animals and birds will get rabies?*

ANSWER: We believe that rabies is contracted only by being bitten by an animal affected with it. Dogs, wolves, coyotes, skunks and all of the ordinary domestic animals are known to be susceptible. Domestic fowl are said to contract rabies but we know of no other birds having it. If fowls will take it, however, it is likely that other gallinaceous birds such as grouse might also. Animals which have contracted rabies act unnaturally and are especially noted as desiring to bite other animals or man.

QUESTION: *What are the gold, and also silver, particles sometimes seen on leaves and stems of flowers when they are magnified 30 diameters?—C. M.*

ANSWER: The spots may be variously classified. Stems and leaves are covered sometimes with small spots of some resinous substance or with small hairs or spicules.

QUESTION: *What does the study of zoology embrace?—V. M.*

ANSWER: The study of zoology includes that of the entire animal kingdom, and with phytology, the science of plants, makes up biology, the science of all living organisms.

QUESTION: *Will you give me the correct pronunciation of the word azalea?*—B. F. M.

ANSWER: Botanists generally pronounce azalea as it is given in the Century Dictionary; i.e.: a za lea—*a* as in *republican; a* as in *fate; e* as in *mete; a* as in *Persia.* The accent is on the second syllable.

QUESTION: *In a sap maple tree growing in front of my house lives a white squirrel. I have not been able to get near enough to the animal to see the color of its eyes and I am not certain if there are such things as Albino Squirrels. This squirrel is practically pure white with a tail inclined to be gray. He seems to be in this hole by him-*

self and has no associations with other squirrels. He is about the size of a red squirrel with a very bushy tail. There are no gray squirrels in my neighborhood. Can you give me any idea of this animal, whether it is a distinct type, an Albino or a freak?—H. S. B.

ANSWER: Albinism occurs with relative frequency in all types of squirrels. If the animal you refer to is the size of a red squirrel it is certainly an albinistic specimen of that species, disregarding the remote possibility that some foreign introduced species has escaped.

QUESTION: *Can owls see as well in day as at night?*—H. B. M.

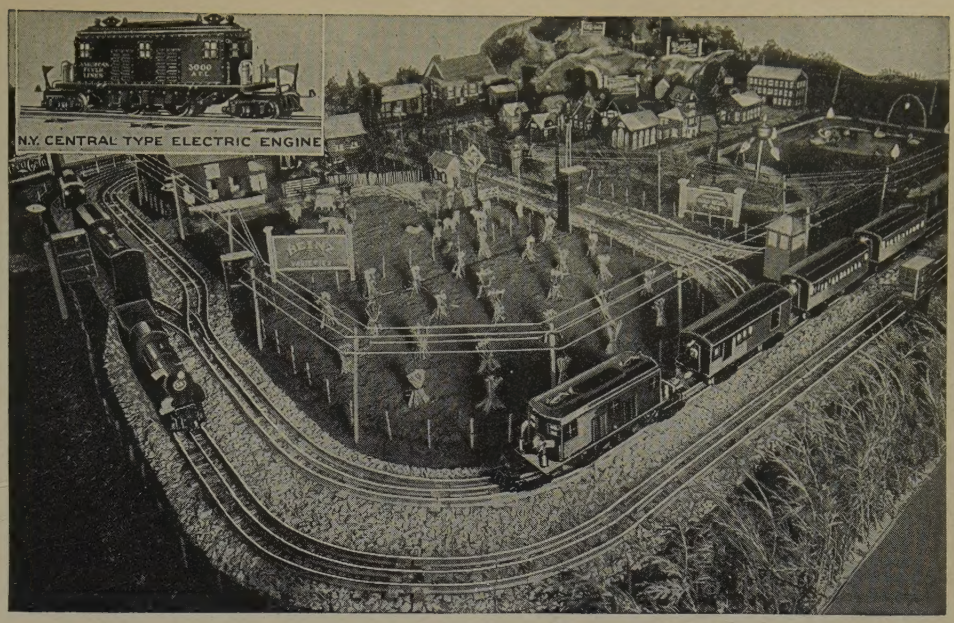
ANSWER: There are 14 species of owls inhabiting the United States and Canada. Of this number at least five do most of their hunting in the daylight hours. These are the pigmy, burrowing, hawk, short-eared and snowy owls. All can see quite well in the dark except the snowy, the pupils of whose eyes are incapable of expansion and contraction to the extent of other nocturnal owls. Of the purely nocturnal species, by contraction of their pupils they are able to see quite as well in the daylight, but just as with the photographic camera the closing of the lenses of the eyes slows up the vision.

Planning the Village

City planning has progressed to the point of nearly universal recognition of its value. Planning boards are now almost an essential of municipal government. But what of the villages, in which dwell more than twenty million of our population? This question is answered in a new bulletin published by the United States Department of Agriculture and prepared by Wayne C. Nason, assistant agricultural economist. The bulletin presents an excellent brief for rural planning, discusses types of planned villages and goes into considerable detail about items of proper planning. It is a publication that should have the careful consideration of town fathers throughout the United States.

To Study Quail

With a view to checking decrease in the number of quail several large land holders in the section between Thomasville, Georgia, and Tallahassee have raised a fund through which a corps of naturalists, in cooperation with the United States Biological Survey are studying all the conditions surrounding the life of quail in the vicinity. A number of birds have already been banded as an aid in studying their movements, and many other interesting lines of inquiry have been started. A report of progress has already been published.



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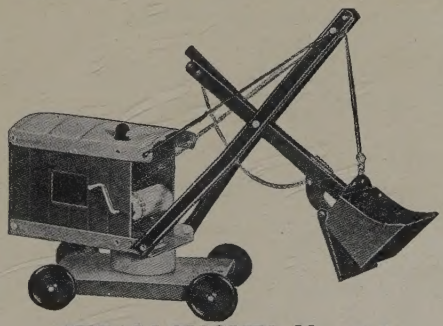

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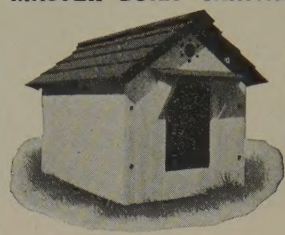

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THE TREE PLANTING ARMY

Mrs. Don T. Barnes Wins the Georgia Forestry Prizes; Vermont Names State Forest for Coolidge

Mrs. Don T. Barnes of Royston, Georgia, is the winner of the loving cup for the best forestry work by a member of the Georgia Federation of Women's Clubs. Mrs. Barnes also won the book "Trees As Good Citizens," by Charles Lathrop Pack, awarded to the District Chairman reporting the most trees planted. Mrs. W. W. Stark, vice president of the Georgia Forestry Association, offered the silver loving cup to the club district sending in the best report of forestry work. The awards were made at the meeting of the Council of the Georgia Federation in Tallulah Falls. Mrs. Walter Hodges, president of the Eighth District, received the prizes in the name of the District. Mrs. Barnes reported 800 trees planted.

"The Calvin Coolidge State Forest" is the name given by Governor Franklin S. Billings to a tract set aside in Vermont. The tract adjoins the birth place of the president and covers 175 acres on the main highway from Bridgewater Corners to Plymouth. It is to serve as a demonstration area.

A tree was planted on the Dixie Highway, Cincinnati, opposite the Avon Hills Golf course, in honor of America's "unknown dead" in the World War. Mrs. C. W. Bosworth planted the tree and unveiled the tablet. The Girl Scouts sang their tree song.

A live oak planted in Cambridge Court, Jackson Heights, by Miss Frances J. Peters, the founder and until her death president of the City Garden Club of New York City, was dedicated as a memorial to her in recognition of her life devoted to public service. The dedication address was delivered by Charles Lathrop Pack.

Hundreds of Girl Scout leaders at the training camp this summer are studying forestry and the town forest proposition in particular. Hundreds of copies of "Town Forests" by Harris A. Reynolds have been distributed by the American Tree Association at the training camps. This is part of the educational campaign being conducted by Mrs. Jane D. Rippin leading up to the tree planting on Oct. 31, Founder's Day, in honor of Mrs. Juliette Low, who established the Girl Scout movement in this country. At Camp Andree a memorial road has been named in honor of the founder and this is to be planted with trees.

The Shriners are boosting tree planting in many places. At Macon, Georgia, the Shrine gave a camp of 250 acres to the Boy Scouts and James E. Chandler, when Imperial Potentate, planted trees there. A reforestation club in the Boy Scout Council has been organized by Charles C. Harrold.

Alvan T. Fuller, governor of Massachusetts, and his son, Alvan T. Fuller, Jr., have joined the Tree Planting Army. Following their planting the application blanks were filled out and registered with the American Tree Association.

Thirteen memorial trees were planted at Ogdensburg, New York, in honor of Company D., Capt. Clark A. Briggs reports.

The General Federation of Women's Clubs continues its work of encouraging planting of trees. The influence of its backing of similar programs in other states was one of the chief recommendations made at the biennial convention by Miss Vida L. Newsom, of Columbus, Indiana, in her report of the activities of the committee on the highways and memorial tree planting. Miss Newsom presented details of the committee's work in all the states during the biennium since the last convention. Continued cooperation with the American Tree Association was urged and many examples of that cooperation outlined.

The Indiana Woman's Relief Corps, at the opening session of its state convention, honored Clara Barton by the planting of a tree on the west side of the Irving School grounds. The program was in charge of Mrs. Claudie Erther. The tree was presented by W. M. McDermott, of the Archer Post.

The Woman's Club of Millville, N. J., the chairman of whose Tree Committee is Kate H. Neal, has joined the Tree-planting Army by planting at their new clubhouse.

At the direction of Hilda Waalkes, Room 202 in the West Pullman School, Chicago, has joined the Tree-planting Army and registered the trees with the association.

Summit County, Ohio, according to Mrs. W. W. Milar, the Ohio Federation of Women's Clubs claims the state leadership by the planting of forty thousand trees during American Forest Week. Dr. W. O. Thompson, president, Ohio State University, was one of the speakers on the radio forestry program.

The only way to join The American Tree Association is to plant a tree and register it with the Association, 1214 Sixteenth Street N.W., Washington, D. C. The Association will send tree-planting suggestions and a tree-day program for two cents to pay postage.

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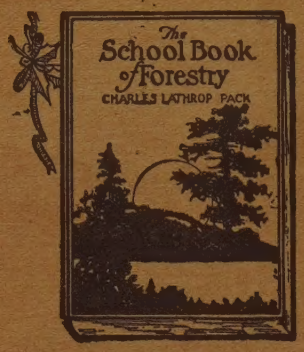

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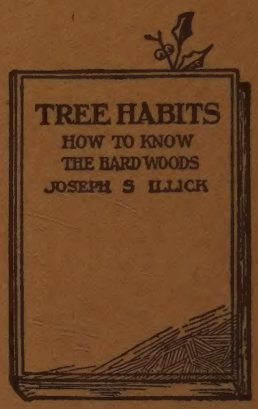

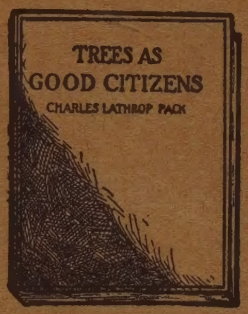

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